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SERVICE MANUAL

SPECTRUM ANALYZER  
**MS710C/D/E/F**

Applicable Serial Nos.  
start from MT05177  
1991.03 Ver. III  
Printed in Japan  
1991.03 x 100 N(III)-21(Y)

### CERTIFICATION

ANRITSU CORPORATION certifies that this instrument has been thoroughly tested and inspected, and found to meet published specifications prior to shipping.

Anritsu further certifies that its calibration measurements are based on the Japanese Electrotechnical Laboratory and Radio Research Laboratory standards.

### WARRANTY

All parts of this product are warranted by Anritsu Corporation of Japan against defects in material or workmanship for a period of one year from the date of delivery. In the event of a defect occurring during the warranty period, Anritsu Corporation will repair or replace this product within a reasonable period of time after notification, free-of-charge, provided that: it is returned to Anritsu; has not been misused; has not been damaged by an act of God; and that the user has followed the instructions in the operation manual.

Any unauthorized modification, repair, or attempt to repair, will render this warranty void.

This warranty is effective only for the original purchaser of this product and is not transferable if it is resold.

ALL OTHER EXPRESSED WARRANTIES ARE DISCLAIMED AND ALL IMPLIED WARRANTIES FOR THIS PRODUCT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. IN NO EVENT SHALL ANRITSU CORPORATION BE LIABLE TO THE CUSTOMER FOR ANY DAMAGES, INCLUDING LOST PROFITS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, ARISING OUT OF THE USE OR INABILITY TO USE THIS PRODUCT.

All requests for repair or replacement under this warranty must be made as soon as possible after the defect has been noticed and must be directed to Anritsu Corporation or its representative in your area.



**WARNING**

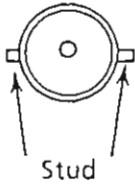
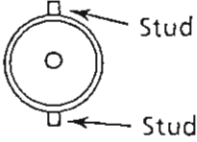
**NO OPERATOR SERVICEABLE PARTS INSIDE .  
REFER SERVICING TO QUALIFIED PERSONNEL .**

**CAUTION**

**FOR CONTINUED FIRE PROTECTION REPLACE  
ONLY WITH SPECIFIED TYPE AND RATED FUSE .**

## BNC-TYPE CONNECTOR INSTALLATION

The BNC-type connector installation has been modified as follows:

Before Modification	After Modification
 <p>The diagram shows a circular BNC connector with a central pin. Two small rectangular studs are located on the outer ring, one on the left and one on the right. Two arrows point from the label 'Stud' to these two studs.</p>	 <p>The diagram shows the same circular BNC connector, but the studs have been moved to the top and bottom positions. Two arrows point from the label 'Stud' to these two studs.</p>

# HISTORY OF MODIFICATIONS (MS710C/D/E/F Ser.)

ITEM	DESCRIPTION		Applicable Serial No.
	Before Modification	After Modification	
P.6-25	Parts List: Z22 IF BPF/AMP 1 (44W83950 6/16)  J3 CONNECTOR, (27DP-LP-1.5W-201)	J3 PLUG, (27DP-LP-1.5QEW-AA)	
P.6-30	Parts List: Z24 LOCAL CONTROL 2 (44W83952 1/5)  C10 CER, (CK924F1H104Z) 0.1μF, +80/-20%, 50V C24 CER, (CK924F1H104Z) 0.1μF, +80/-20%, 50V	C10 ELECT, (CE04C1A101A) 100μF, ±20%, 10V C24 PLAST, (ECQ-V1H105JW) 1μF, ±5%, 50V	
P.5-167/ (5-168 blank)	Fig. 5-62 (2/3) Z24 LOCAL CONTROL 2 Circuit Diagram (43W33955 2/3)  C10 0.1	C10 100	
P.6-35	Parts List: Z26 CPU BOARD (44W83954 4/6)  R6 Not assigned	R6 CF, (ARD25T272J) 2.7kΩ, ±5%, 1/4W	
P.5-211/ (5-212 blank)	Fig. 5-71 (2/5) Z26 CPU BOARD Circuit Diagram  43W33957 2/5	43W33957 2/5 M-1	
P.6-36	Parts List: Z27 DISPLAY CONTROL (44W83955 2/7)  C77 Not assigned	C77 CER, (CK924C1H222-104M) Note: 0 to 1 open	
P.5-169/ (5-170 blank)	Fig. 5-62 (3/3) Z24 LOCAL CONTROL 2 Circuit Diagram (43W33955 3/3)  C24 0.1	C24 1	
P.5-237/ (5-238 blank)	Fig. 5-82 (1/6) Z27 DISPLAY CONTROL Circuit Diagram  43W33958 1/6	43W33958 1/6 M-1	
			From MT97674

HISTORY OF MODIFICATIONS  
(MS710C/D/E/F Ser.)

ITEM	DESCRIPTION		Applicable Serial No.
	Before Modification	After Modification	
P.5-239/ (5-240 blank)	Fig. 5-82 (2/6) Z27 DISPLAY CONTROL Circuit Diagram  43W33958 2/6 M-1	43W33958 2/6 M-2	From MT97674
P.5-241/ (5-242 blank)	Fig. 5-82 (3/6) Z27 DISPLAY CONTROL Circuit Diagram  43W33958 3/6 M-1	43W33958 3/6 M-2	

HISTORY OF MODIFICATIONS  
(MS710C/D/E/F Ser.)

ITEM	DESCRIPTION		Applicable Serial No.
	Before Modification	After Modification	
P.5-147	Fig.5-58 (3/6) Z22 IF BPF/AMP 1 Circuit Diagram (3/6) (43W33953)  R125 68 k	R125 22 k to 68 k	From MT82668
P.5-181	Fig. 5-64 (1/5) Z25 LOG/LIN AMP DETECTOR Circuit Diagram (1/5) (43W33956)  R 9 1.00 k to 1.15 k	R 9 909 to 1.15 k	
P.6-8	Parts List: Z1 FRONT PANEL I (44W83921 2/4)  R 2 Var,MF,(RJ-6P 100 $\Omega$ ) 100 $\Omega$ ,1/2W	R 2 Var,MF,(RJ-6S 100 $\Omega$ ) 100 $\Omega$ ,1/2W	
P.6-26	Parts List: Z22 IF BPF/AMP 1 (44W83950 12/16)  R125 CF,(ARD25T683J) 68k $\Omega$ , $\pm 5\%$ ,1/4W	R125 CF,(ARD25T * J) 22k to 68k $\Omega$ , $\pm 5\%$ ,1/4W NOTE: *	
P.6-33	Parts List: Z25 LOG/LIN AMP DETECTOR (44W83953 8/13)  R 9 MF,(RN14K2E * D) 1k to 1.15k $\Omega$ , $\pm 0.5\%$ ,1/4W	R 9 MF,(RN24K2E * D) 909 $\Omega$ to 1.15k $\Omega$ , $\pm 0.5\%$ ,1/4W	

# ECTOR, AND D/A CONVERTERS

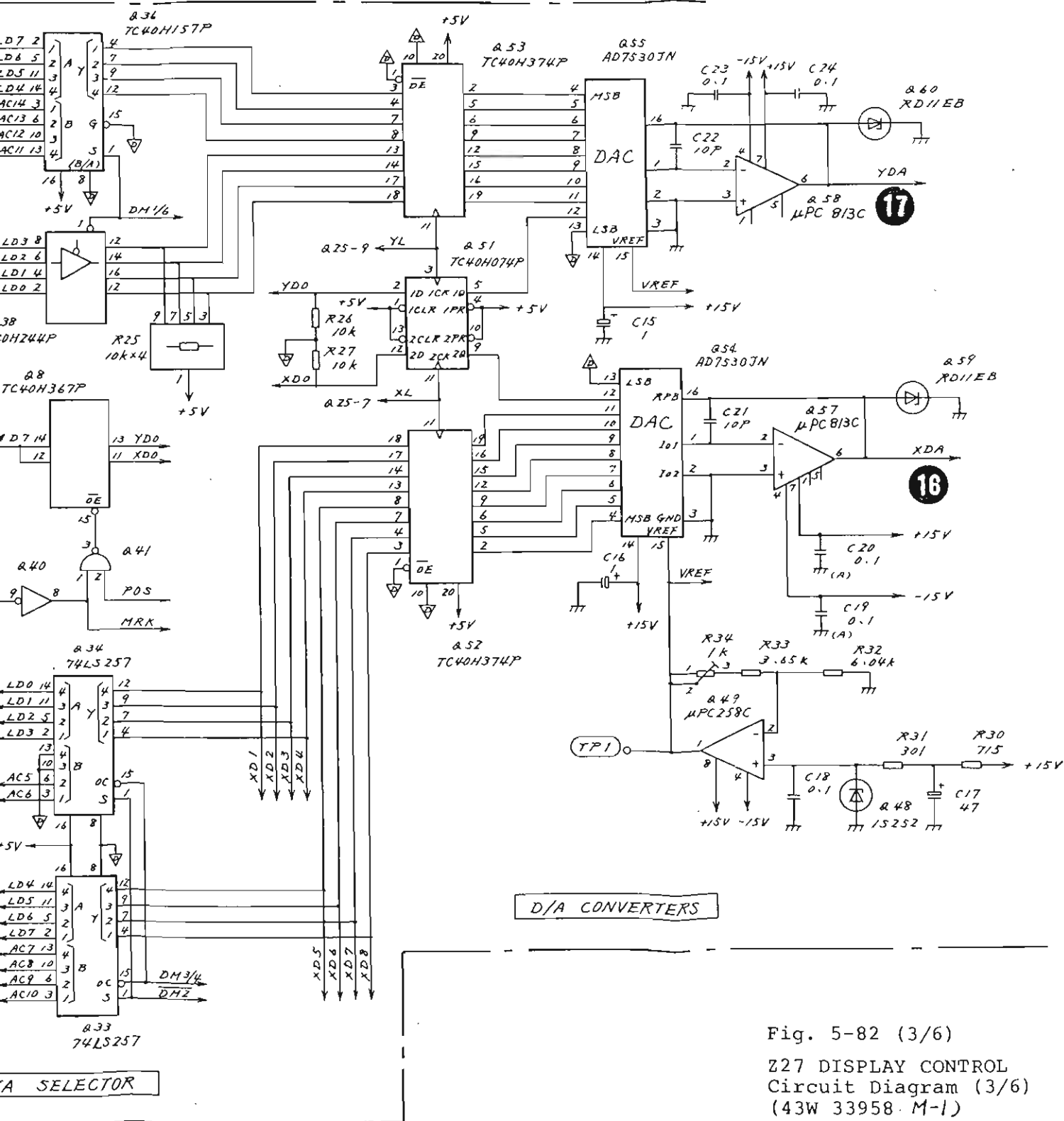
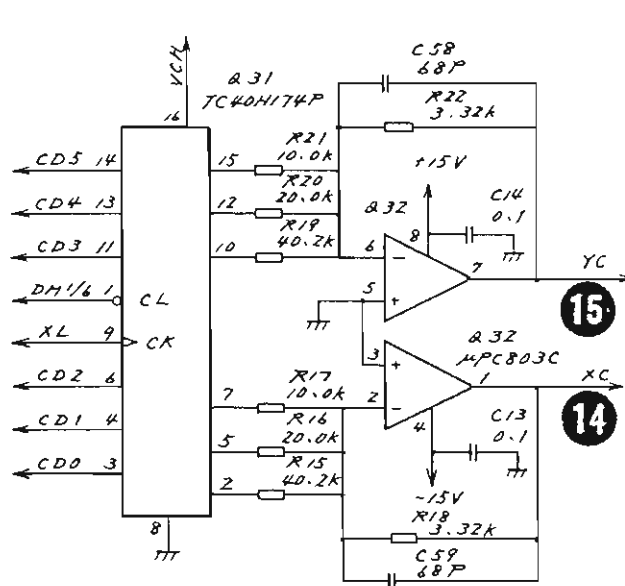


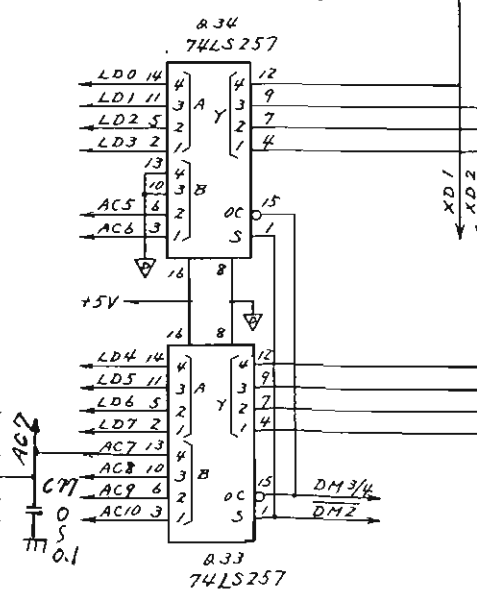
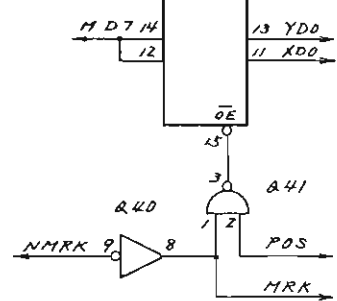
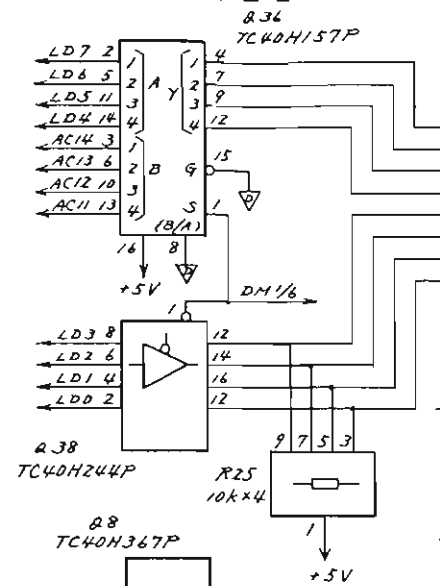
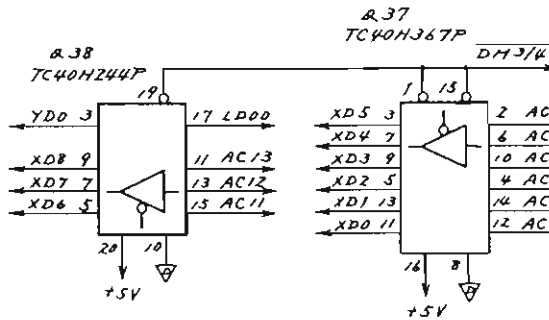
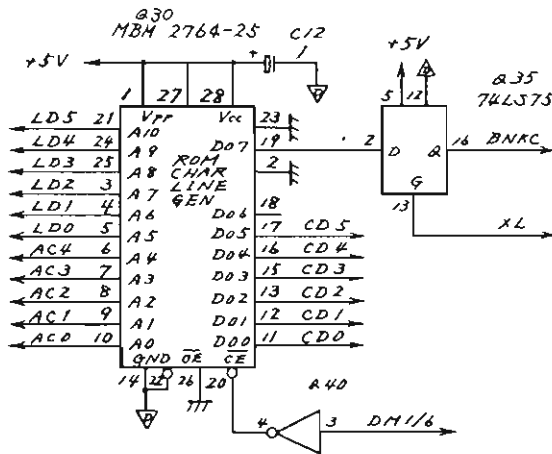
Fig. 5-82 (3/6)

Z27 DISPLAY CONTROL  
Circuit Diagram (3/6)  
(43W 33958 M-1)

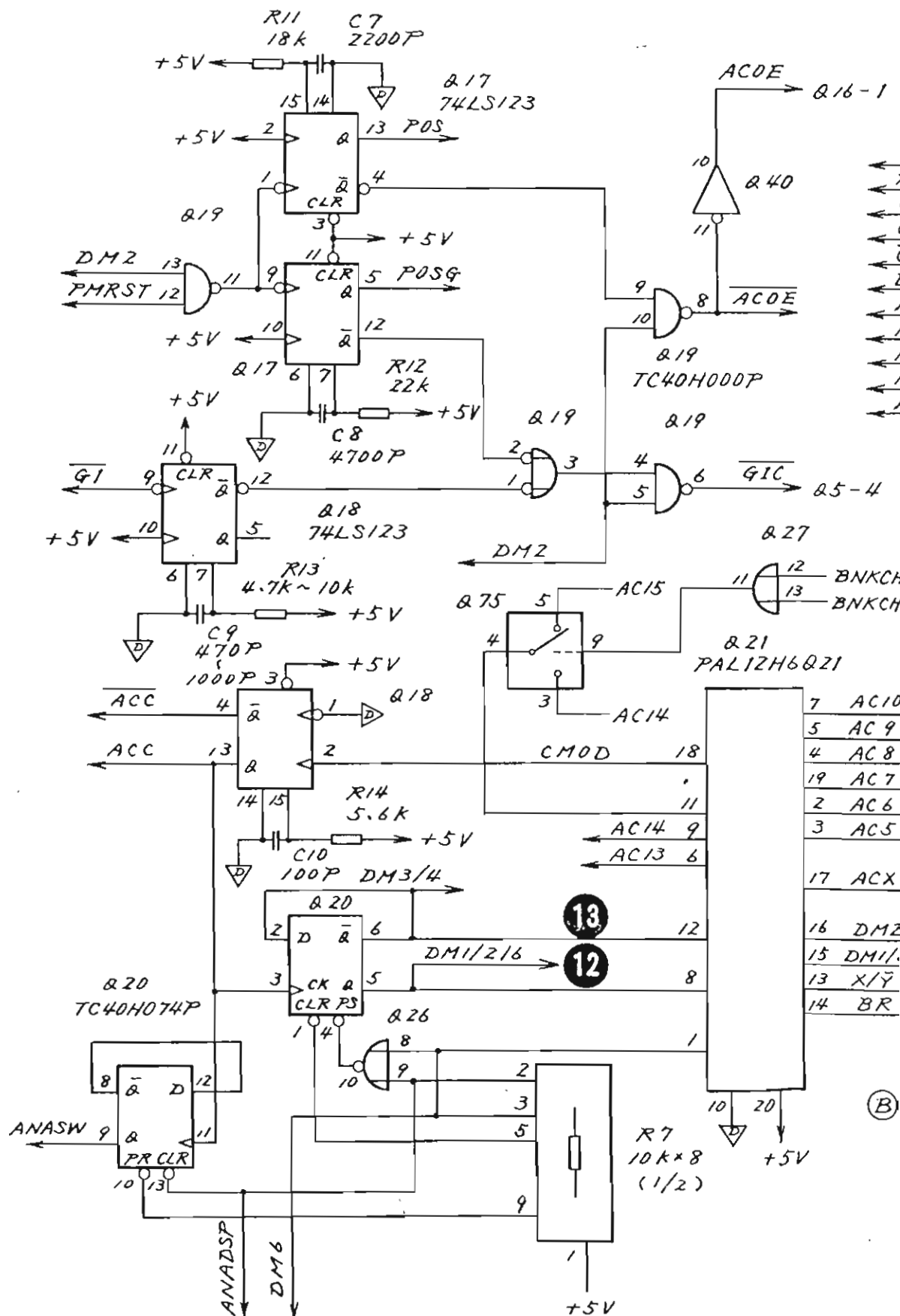
# C CHARACTER GENERATOR, DATA SELECTOR, AND D/A CONVERTER



CHARACTER GENERATOR



DATA SELECTOR





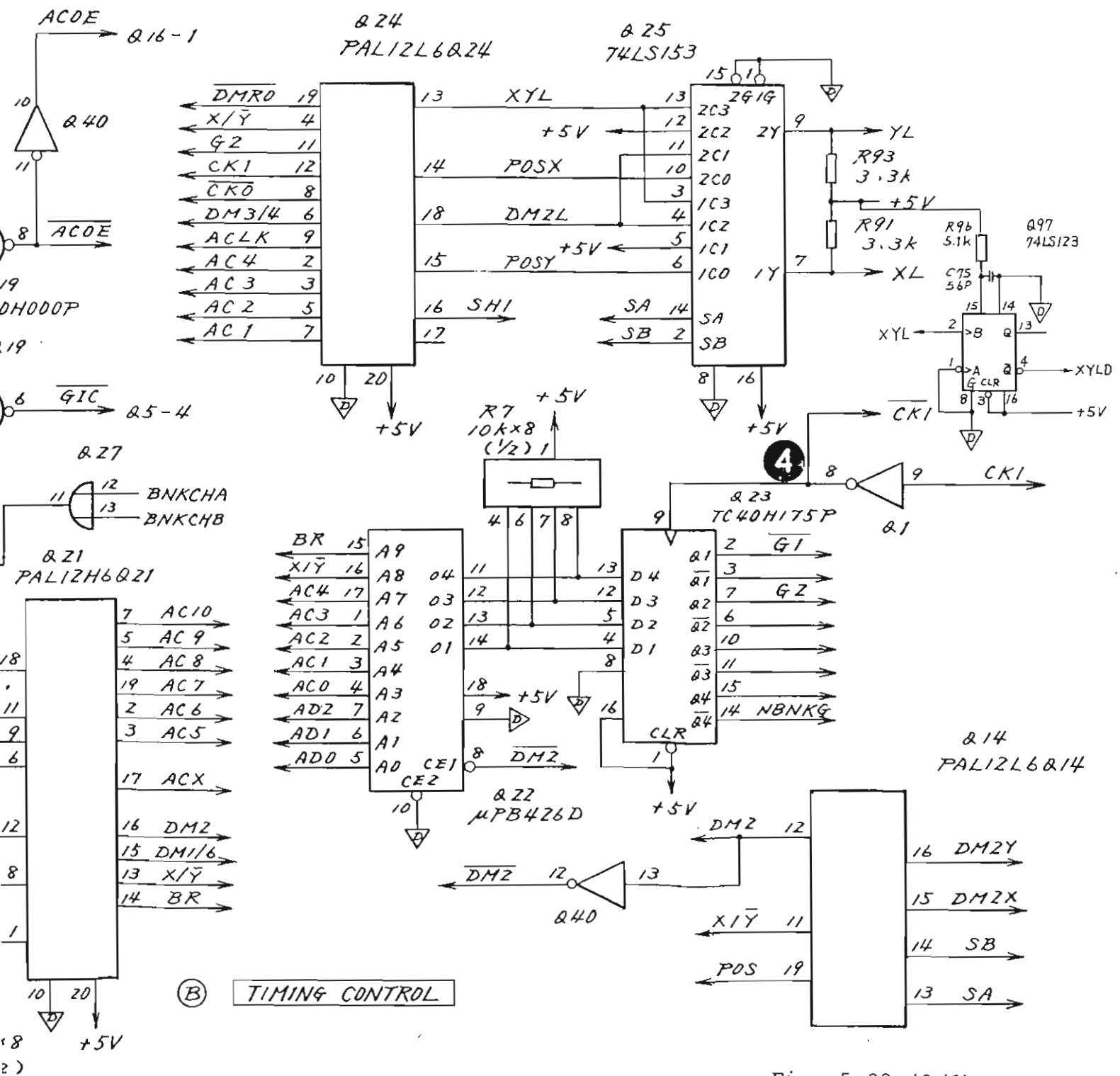
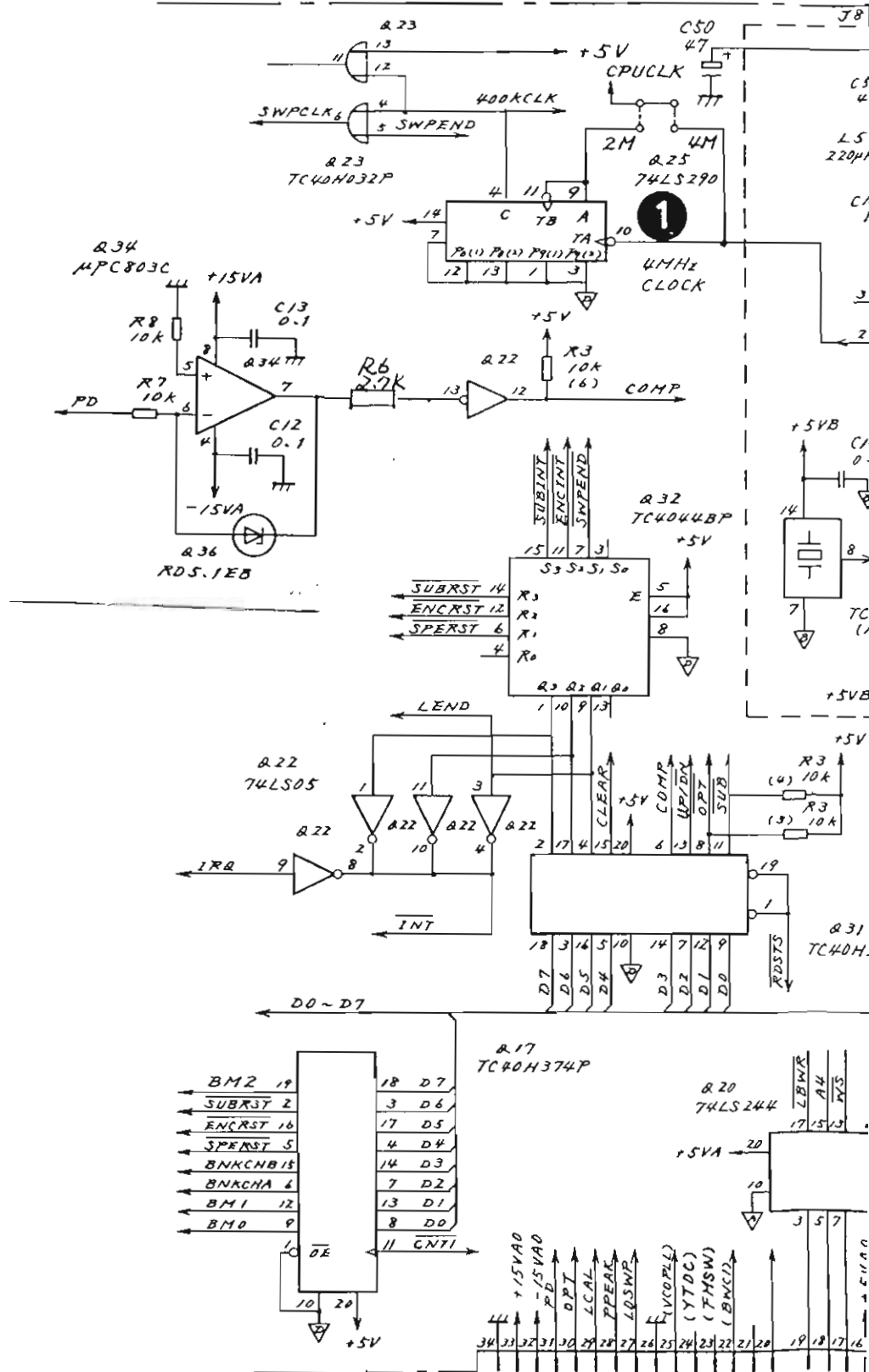


Fig. 5-82 (2/6)

Z27 DISPLAY CONTROL  
Circuit Diagram (2/6)  
(43W 33958 M-2)

5-239/(5-240 blank)

# (B) CLOCK OSC AND I/O PORTS



16/N (MHz). N=16 to 47  
340.4 to 1000 KHz, TTL  
to Z16-J11

To Z1  
(Panel Control)

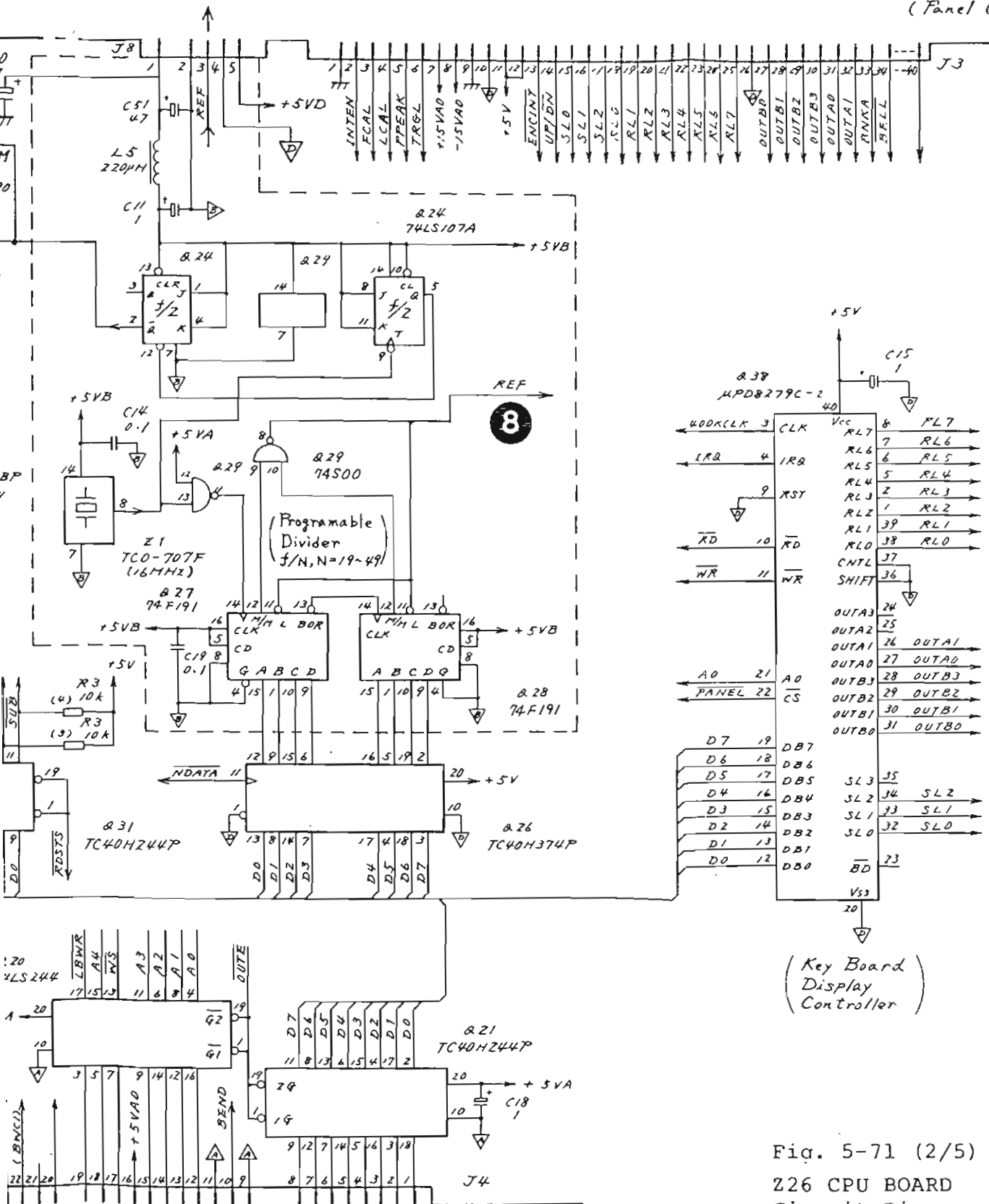
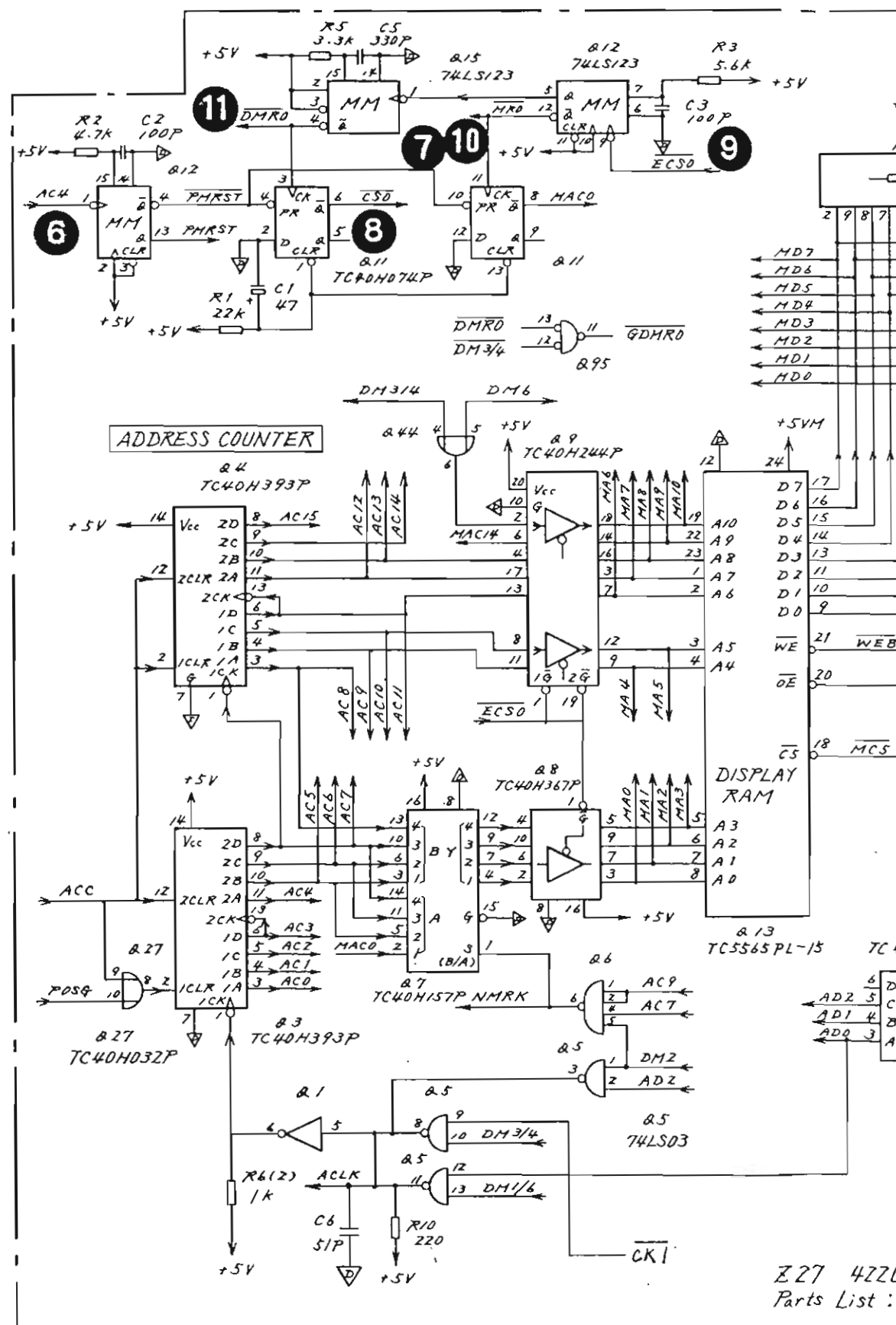


Fig. 5-71 (2/5)

Z26 CPU BOARD  
Circuit Diagram (2/5)  
(43W 33957 M-1)

5-211/(5-212 blank)



Z27 422U  
Parts List :

# (A) DISPLAY RAM AND ACCESS CONTROL

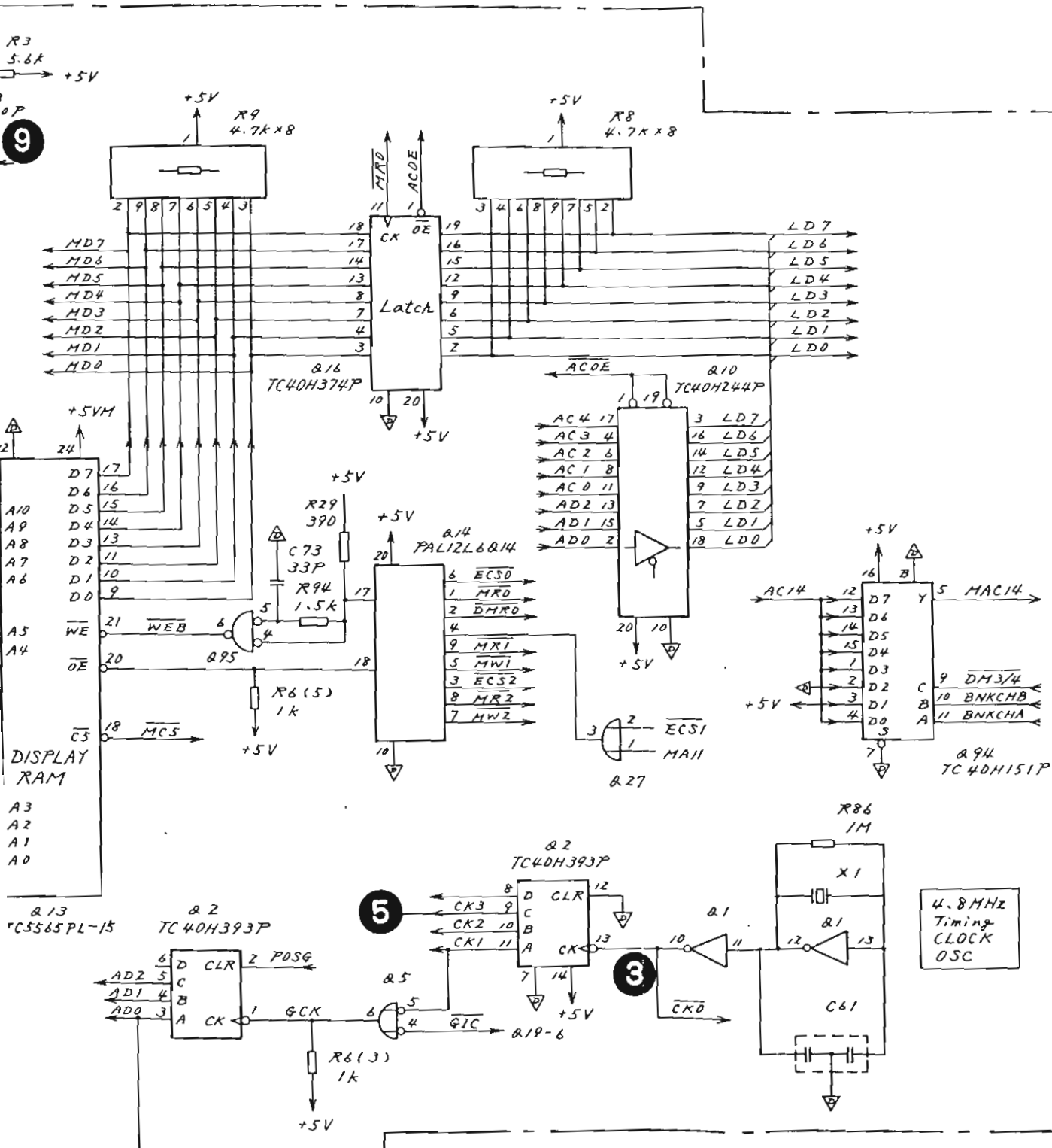


Fig. 5-82 (1/6)

Z27 DISPLAY CONTROL  
Circuit Diagram (1/6)  
(43W 33958 M-1)

Z27 422U12714  
Parts List: 44W83955

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## SECTION 1

### GENERAL

#### 1.1 Configuration

This manual explains the troubleshooting and repair procedures for the MS710C/D/E/F (called MS710[ ] hereafter) Spectrum Analyzer. It contains the following contents:

Section 2 explains how to disassemble each part necessary when checking a suspected faulty block. This section also includes the parts list of mechanical components.

Section 3 explains the entire signal flow for each part based on the MS710[ ] block diagram, and provides the basic knowledge required for MS710[ ] troubleshooting.

Section 4 explains how to locate a faulty block according to the failure symptoms. This section also contains the overall circuit diagram of the MS710[ ] (interblock connection diagram).

Section 5 contains circuit diagrams and a detailed description of each block (PC board). The voltages, signal levels, and waveforms are explained at the check-points for troubleshooting. The adjustment procedure for each block is also included.

Section 6 explains the replaceable parts list and precautions when ordering.

#### 1.2 Parts/Block Indications

In this manual, each part (block) mounted on the MS710[ ] is indicated by a part number (Z number) which is commonly used in the explanations and drawings.

The connection part for each cable has the same J number in the explanations and drawings in this manual.

In this manual, when two part numbers are indicated by - (Z14-Z8 for example), the number after the hyphen is a smaller block number in the larger block indicated by the number preceding the hyphen.

For example, Z14-Z8 indicates that the Z8 100 MHz REF OSC PC board is mounted in the larger block Z14 (0 to 2 GHz RF block).

Z14 (0 to 2 GHz RF block)	—	Z8 (100 MHz REF OSC)
↑		↑
larger block		smaller block

### 1.3 Repair Precautions

#### (1) Electrostatic charge

The MS710[ ] contains many components that are subject to electrostatic damage, such as high-density integrated circuits and super high-frequency semiconductors with precision structures.

These are protected when they are mounted in the MS710[ ]. If a PC board is removed for repair, take preventive measures against electrostatic damage. When soldering, use a soldering iron in which leakage current is not applied to the tip.

#### (2) CRT high voltage

Because some CRT peripheral circuits generate dangerous high-voltage signals, be especially careful when checking these circuits in their "live" state. Do not remove the plastic protective panel that covers the PC board of the Z30 CRT BIAS/X-Y AMP except when checking this circuit.

#### 1.4 Service Kits

The extender board, extender cable, and various connector adapters are required for efficient troubleshooting. These are provided in service kits and are optionally available.

Table 1-1 Service Kit

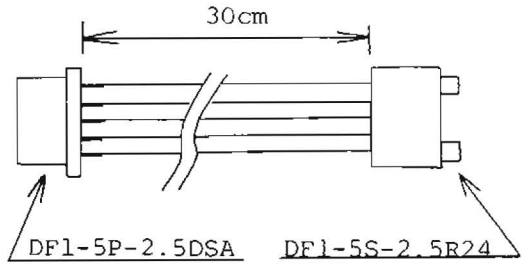
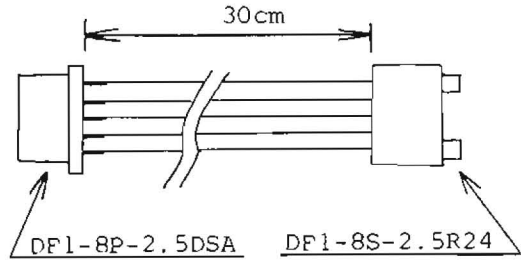
Ordering No.	Name	Qty.	Remarks
449J81722B	Extender Cable	2	 <p>Diagram of a 5-pin extender cable. The cable is 30cm long. It has a DF1-5P-2.5DSA connector on one end and a DF1-5S-2.5R24 connector on the other.</p>
449J81722C	Extender Cable	2	 <p>Diagram of an 8-pin extender cable. The cable is 30cm long. It has a DF1-8P-2.5DSA connector on one end and a DF1-8S-2.5R24 connector on the other.</p>

Table 1-1 Service Kit (Continued)

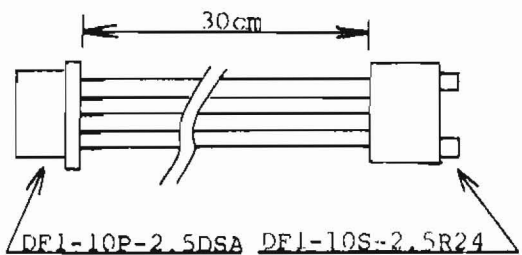
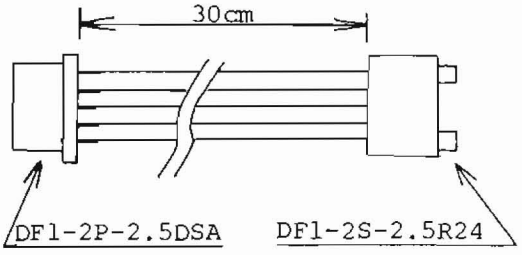
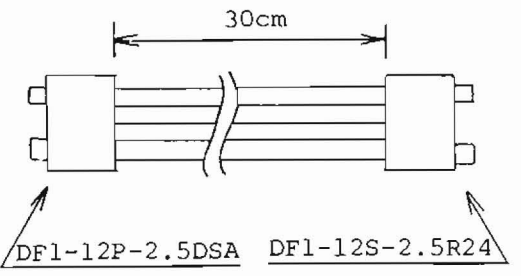
Ordering No.	Name	Qty.	Remarks
49J81722D	Extender Cable	2	 <p>30cm</p> <p>DF1-10P-2.5DSA DF1-10S-2.5R24</p>
449J81722E	Extender Cable	2	 <p>30cm</p> <p>DF1-2P-2.5DSA DF1-2S-2.5R24</p>
449J81722F	Extender Cable	1	 <p>30cm</p> <p>DF1-12P-2.5DSA DF1-12S-2.5R24</p>

Table 1-1 Service Kit (Continued)

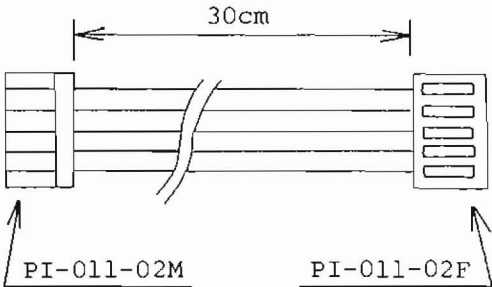
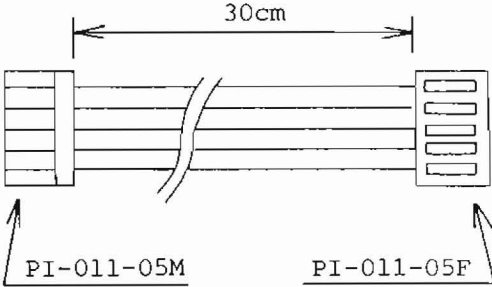
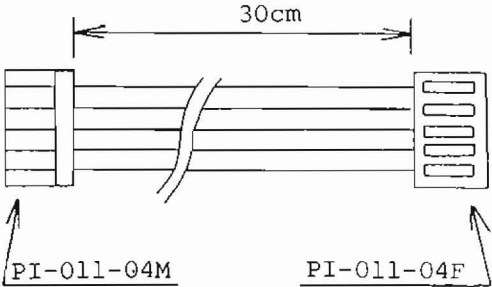
Ordering No.	Name	Qty.	Remarks
449J81723A	Extender Cable	3	 <p>30cm</p> <p>PI-011-02M PI-011-02F</p>
49J81723B	Extender Cable	3	 <p>30cm</p> <p>PI-011-05M PI-011-05F</p>
449J81723F	Extender Cable	2	 <p>30cm</p> <p>PI-011-04M PI-011-04F</p>

Table 1-1 Service Kit (Continued)

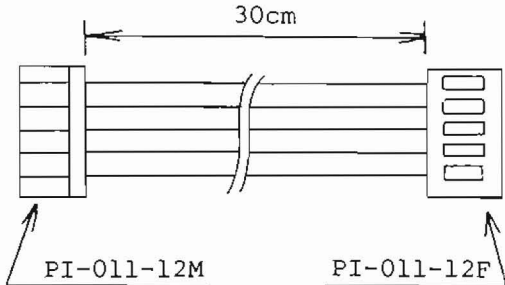
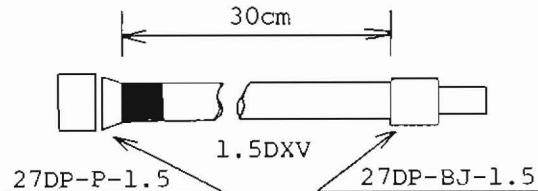
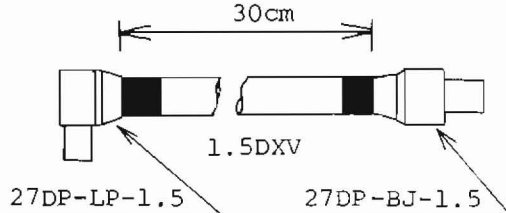
Ordering No.	Name	Qty.	Remarks
449J81723G	Extender Cable	1	 <p>Diagram of a 30cm extender cable. The left connector is labeled PI-011-12M and the right connector is labeled PI-011-12F. The cable length is indicated as 30cm.</p>
449J81725A	Extender Cable	3	 <p>Diagram of a 30cm extender cable. The left connector is labeled 27DP-P-1.5 and the right connector is labeled 27DP-BJ-1.5. The cable length is indicated as 30cm. The central part of the cable is labeled 1.5DXV.</p>
449J81725B	Extender Cable	3	 <p>Diagram of a 30cm extender cable. The left connector is labeled 27DP-LP-1.5 and the right connector is labeled 27DP-BJ-1.5. The cable length is indicated as 30cm. The central part of the cable is labeled 1.5DXV.</p>



Table 1-1 Service Kit (Continued)

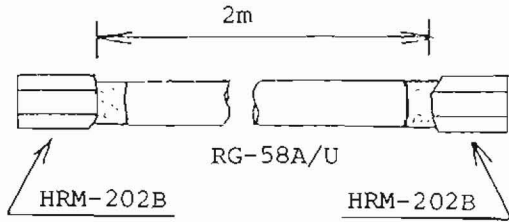
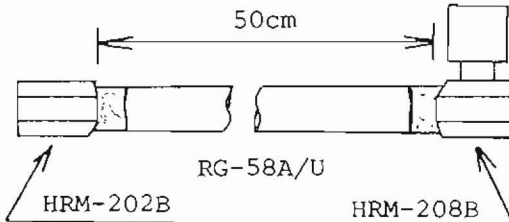
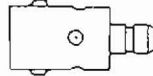
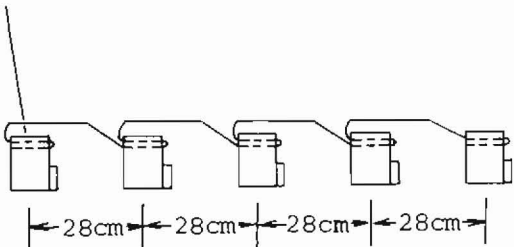
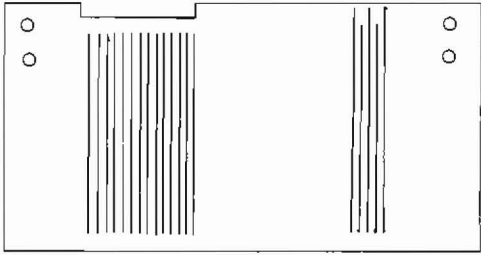
Ordering No.	Name	Qty.	Remarks
449J81725C	Extender Cable	2	 <p>2m</p> <p>HRM-202B</p> <p>RG-58A/U</p> <p>HRM-202B</p>
449J81725D	Extender Cable	3	 <p>50cm</p> <p>HRM-202B</p> <p>RG-58A/U</p> <p>HRM-208B</p>
No. 1305	BNC (J) -UMJ Adapter-2	1	

Table 1-1 Service Kit (Continued)

Ordering No.	Name	Qty.	Remarks
44J74489C	Flat Cable	1	<p>HIF3A-34D-2.54R</p> 
422U13360	Extender Board	1	

## SECTION 2

### MECHANICAL CONFIGURATION

#### 2.1 Introduction

This section will explain disassembling procedures and mechanical configurations of the MS710[ ].

---

#### CAUTION

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When disassembling/reassembling the MS710[ ], turn off the POWER switch on the front panel and disconnect the power supply cord from the ac outlet.

---

#### 2.2 Cabinet Assembly

Tables 2-1 to 2-7 list mechanical parts.

Figures 2-1 to 2-7 show exploded views of the MS710[ ].

Table 2-1 Mechanical Parts List

	No.	PART No.	DESCRIPTION	REMARK	Q'TY
Fig. 2-1	(1)	32B7662	Frame, Front	1MW•4U	1
	(2)	32B7666	Channel, Rear	4U	2
	(3)	33B20662	Protector		4
	(4)		NOT ASSIGNED		
	(5)	32B7670	Channel, Top	450D	2
	(6)	32B7671	Channel, Bottom	450D	2
	(7)	322B7672	Standard Foot		4
	(8)	34B73660C	Tape, Trim	4U	2
	(9)	349B73661	Handle, Side	450D	2
	(10)	33B22452	Cover, Top		1
	(11)	33B22512	Cover, Bottom		1
	(12)	33B22472	Cover, Side		2
	(13)	4BPS8S3	Screw		2
	(14)	4BPS8S3	Screw		2
	(15)	5FPS12S7	Screw		4
	(16)	5FPS10S7	Screw		8
	(17)	4NPS20S7	Screw		8
	(18)	4SW-SU	Spring Washer		8
	(19)	4WBS-B3	Plain Washer		12
	(20)	3HRPS10S3	Screw		8
	(21)	34B73674	Tilt Stand		1

### Cabinet Assembly

(1) Removing the top cover (10)

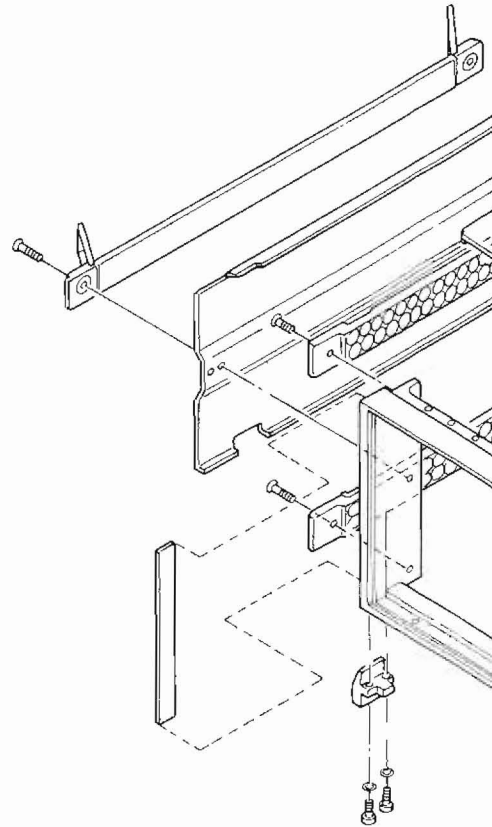
Remove the two screws (13).  
Then, remove the top cover (10) by  
lifting the rear in the direction  
indicated by the \* arrow.

(2) Removing the bottom cover (11)

Remove the two screws (14).  
Then, remove the bottom cover (11)  
from the rear as indicated by the \*  
arrow.

(3) Removing the side cover (12)

Open the handle cover (9) in the  
direction indicated by the \* arrow  
and remove the two screws (15).  
Then, remove the four screws (20) and  
remove the side cover (12).



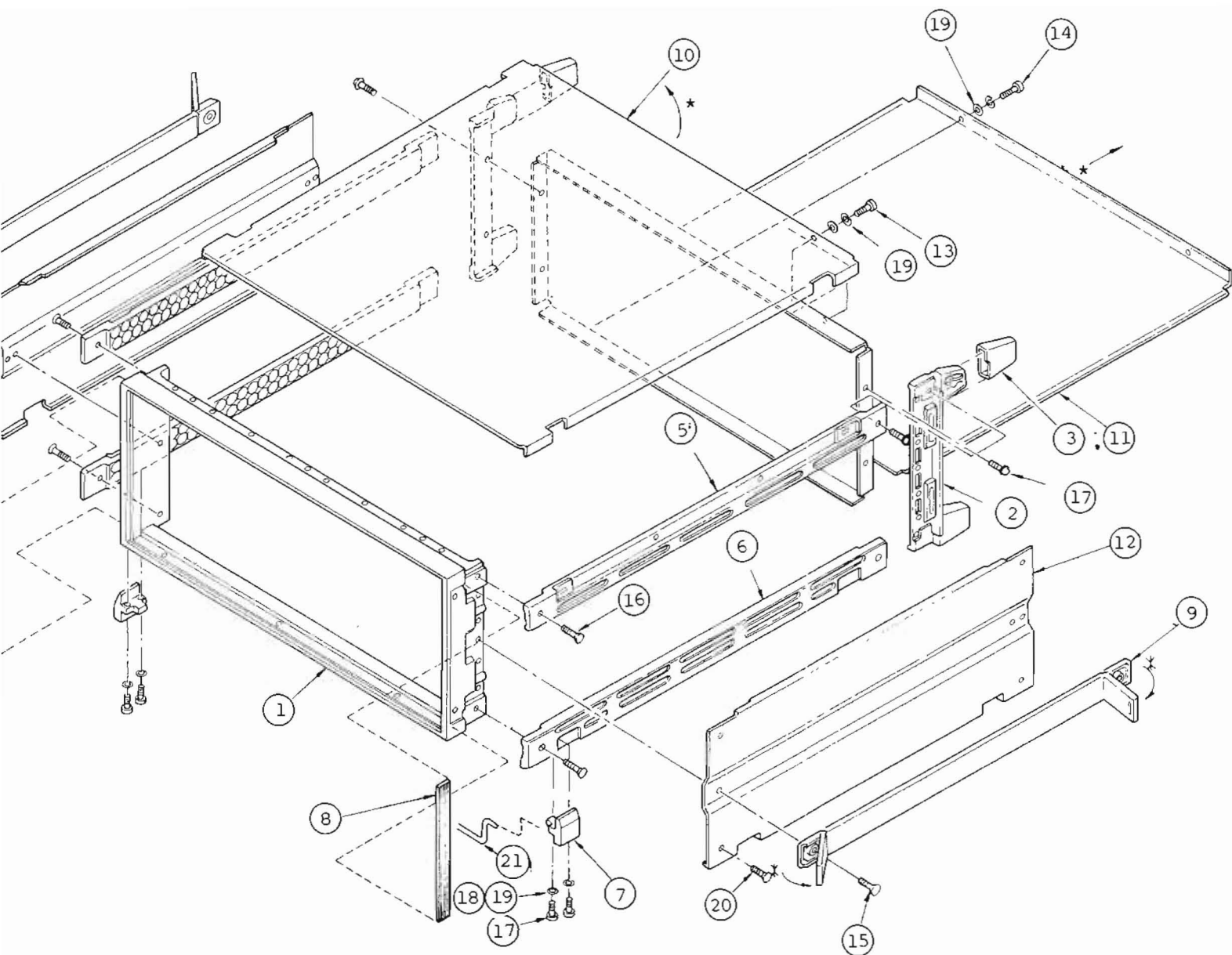


Fig. 2-1 Cabinet Assembly

2-3/(2-4 blank)

Table 2-2 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-2	①	42B12743C	Front panel		1
	②	422B12745	Sub panel		1
	③		Z1 front panel I		1
	④		Z2 front panel II		1
	⑤	349B86530B	Bezel		1
	⑥	34B78330A	Panel clamp		3
	⑦	34B78330B	Panel clamp		3
	⑧	1305	HRM-601D	(MS710C/D only)	1
	⑨	342E73700	Knob		1
	⑩	342E73701	Knob		3
	⑪	44E68583	Button	Character; Power	1
	⑫	342E76657	Button	Character; 10 k - 30 MHz 100 k - 2 GHz etc.	19
	⑬	442E83897A	Button	Character; A	1
	⑭	442E83897B	Button	Character; B	1
	⑮	442E83898A	Button	Character; C	1
	⑯	442E74806B	Button	Character; D	1
	⑰	442E83897C	Button	Character; E	1
	⑱	442E74806C	Button	Character; F	1
	⑲	442E74806D	Button	Character; G	1
	⑳	442E74806E	Button	Character; H	1
	㉑	442E74806F	Button	Character; I	1
	㉒	442E74806G	Button	Character; J	1

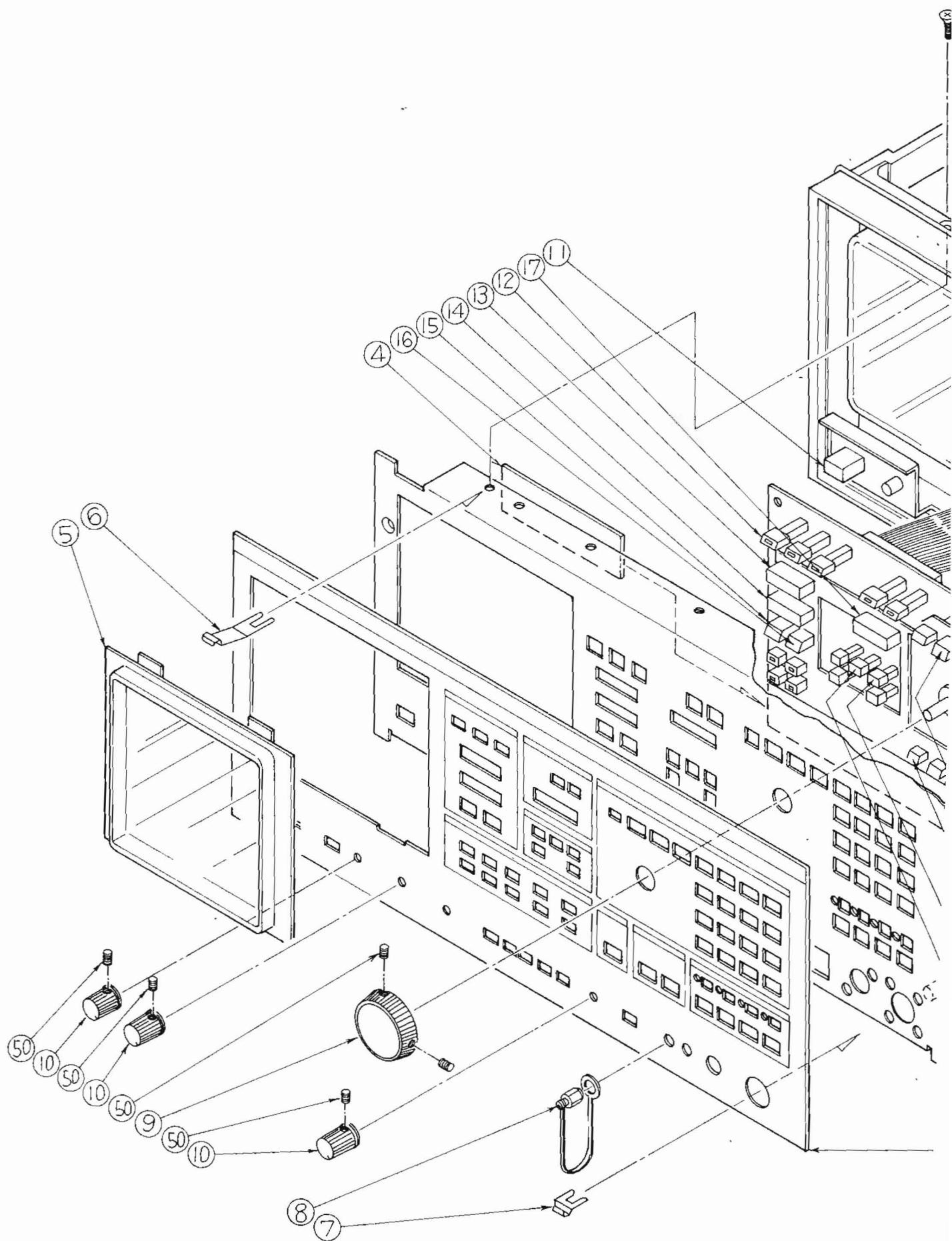
Table 2-2 Mechanical Parts List (continued)

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-2	(23)	442E74806H	Button	Character; K	1
	(24)	442E74806J	Button	Character; L	1
	(25)	442E74806K	Button	Character; M	1
	(26)	442E74806L	Button	Character; N	1
	(27)	442E74806M	Button	Character; O	1
	(28)	442E74806N	Button	Character; P	1
	(29)	442E74806P	Button	Character; Q	1
	(30)	442E74806Q	Button	Character; R	1
	(31)	442E74806R	Button	Character; S	1
	(32)	442E74806S	Button	Character; T	1
	(33)	442E74806T	Button	Character; U	1
	(34)	442E74806AB	Button	Character; V	1
	(35)	442E74806V	Button	Character; W	1
	(36)	442E74806AC	Button	Character; X	1
	(37)	442E74806X	Button	Character; Y	1
	(38)	442E74806Y	Button	Character; Z	1
	(39)	442E74806AA	Button	Character; BS	1
	(40)	442E74806Z	Button	Character; SP	1
	(41)	442E74817A	Button	Character; 《 . 》	2
	(42)	442E74817C	Button	Character; ⤴ . ⤵	2
	(43)	34E76656A	Button	Character; PEAK → CRT, etc.	9



Table 2-2 Mechanical Parts List (continued)

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-2	(44)	34E70073E	Button	Character; TITLE MARKER	2
	(45)	34E70073G	Button	Character; SHIFT	1
	(46)	34E70073D	Button	Character; COPY	1
	(47)	3FPS6B3	Screw		6
	(48)	3FPS10B3	Screw		6
	(49)	3NPS6B3+SW	Screw		10
	(50)	3A0S3	Screw		5



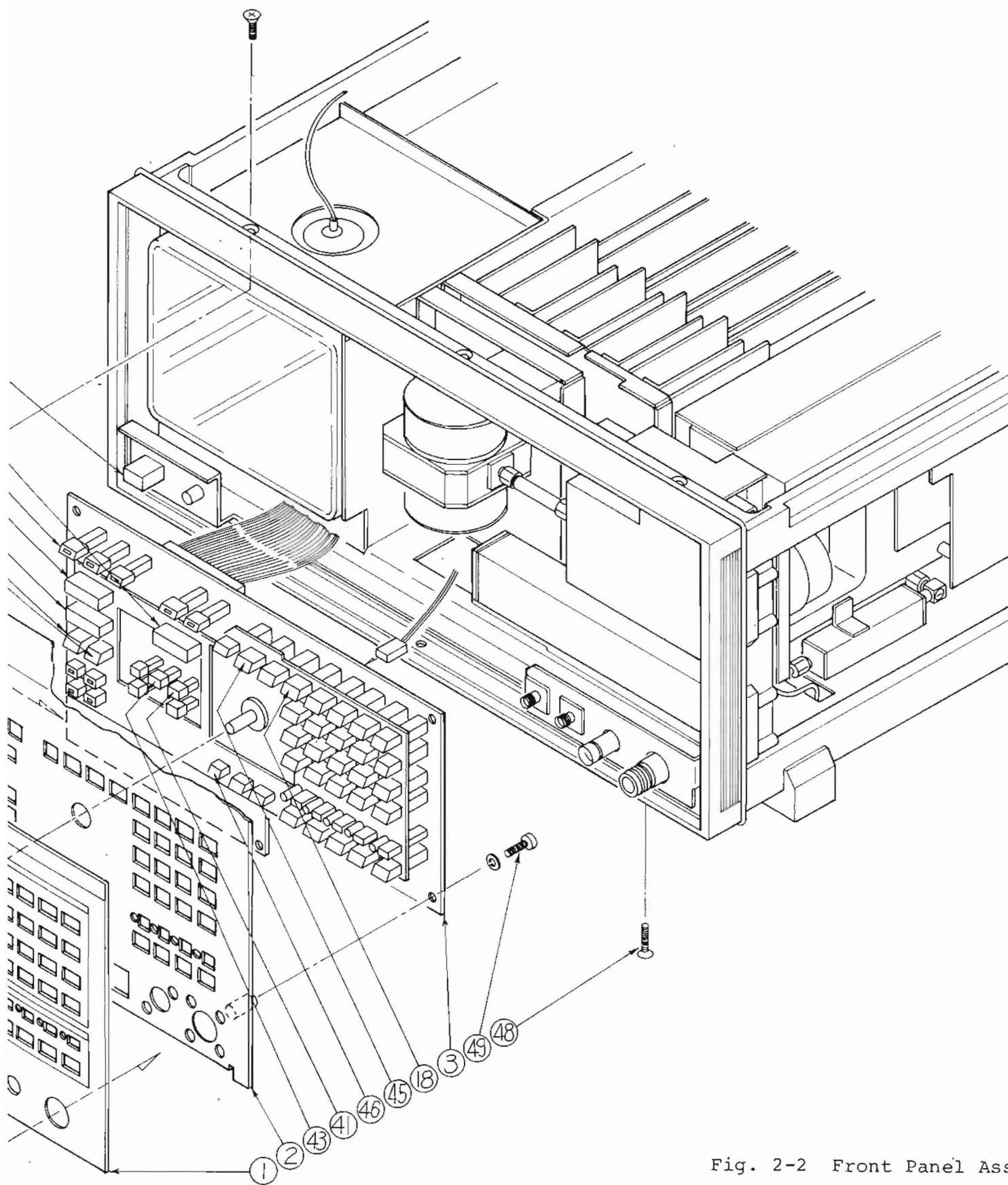


Fig. 2-2 Front Panel Assembly

Table 2-3 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-3	①	422B13225	Rear panel		1
	②		Not assigned		
	③	43B28619	Cover		1
	④	44B73523	Expanded metal		1
	⑤	34B73670	Cord holder		4
	⑥		Not assigned		
	⑦	3BPS851+WBS	Screw		3
	⑧	4NPS10S7SW	Screw		4
	⑨	4NPS12S7SW	Screw		4
	⑩	4BPS8S1+WBS	Screw		4

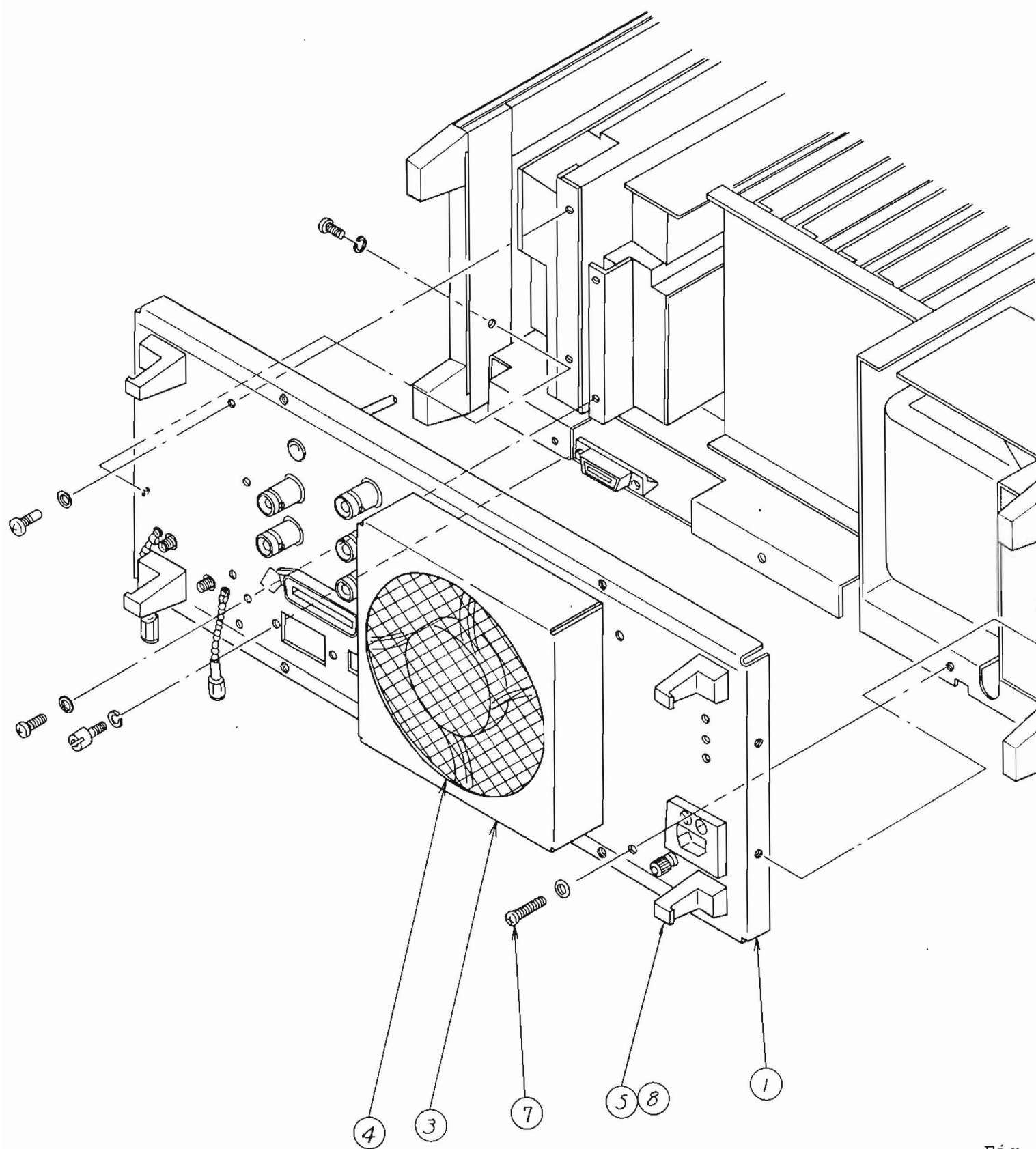


Fig.

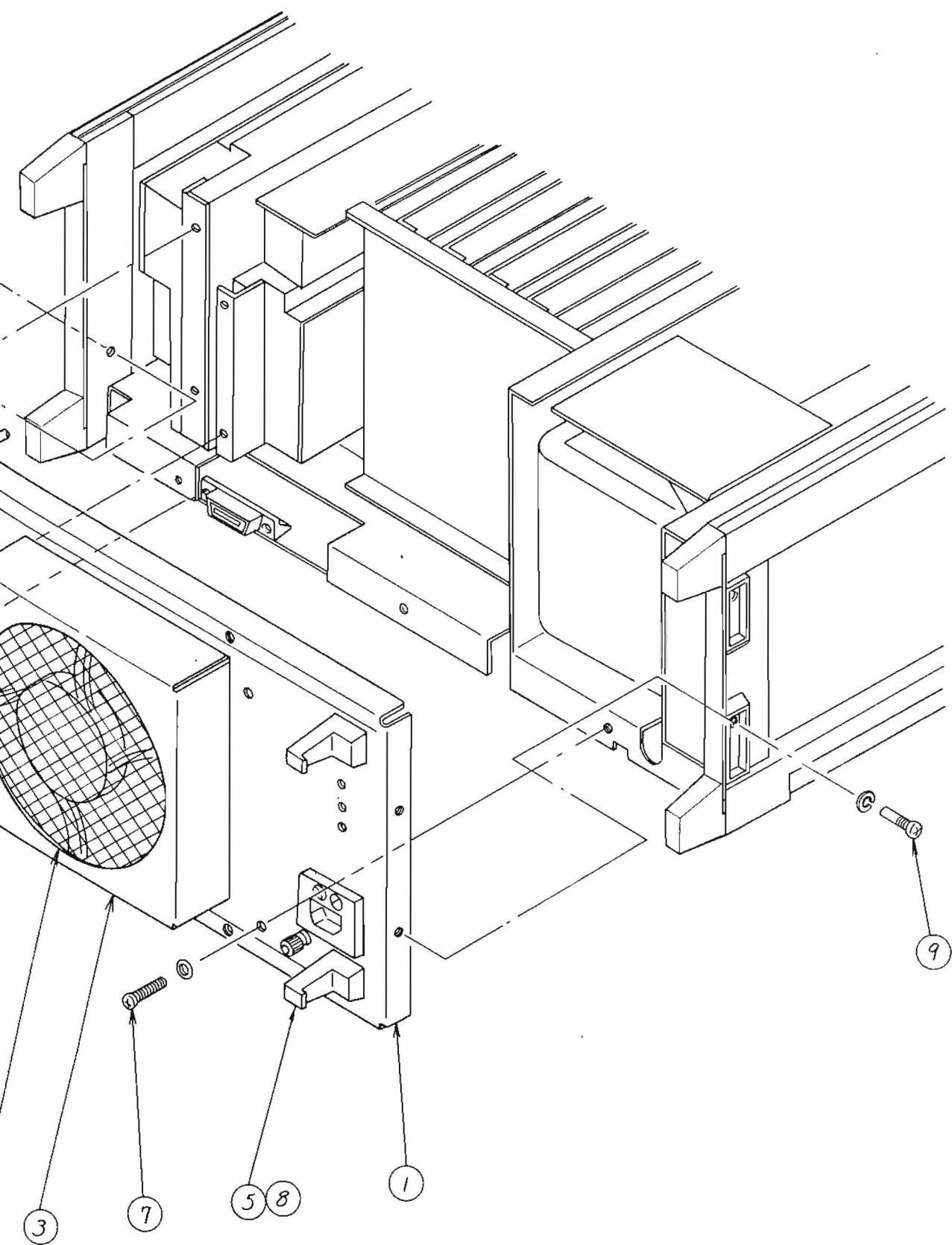
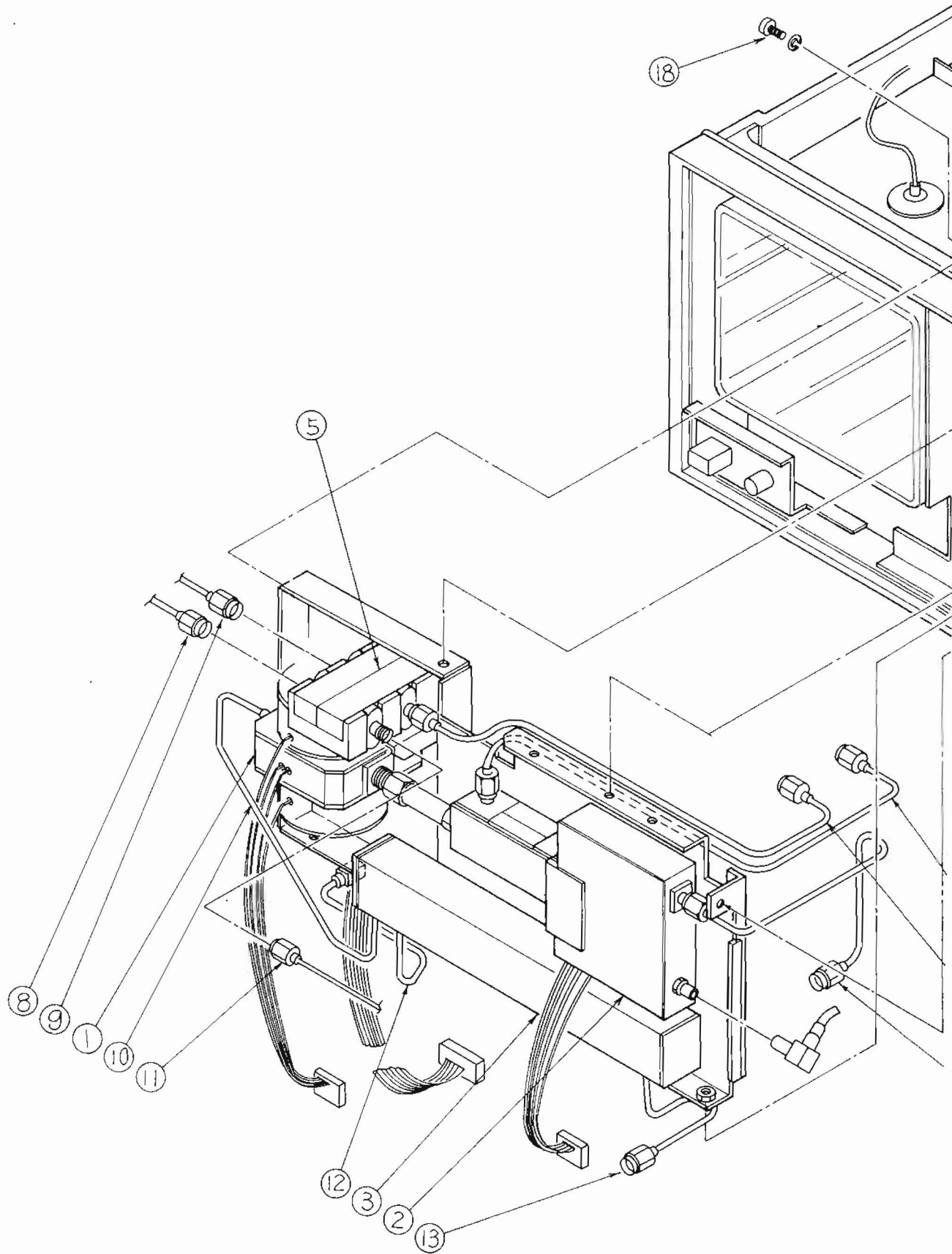


Fig. 2-3 Rear Panel Assembly

2-13/(2-14 blank)

Table 2-4 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-4	(1)	429H10413	Z5 YTF		1
	(2)	429H11322	Z6 u l st converter		1
	(3)	429H10423	Z3 RF ATT		1
	(4)		NOT ASSIGNED		
	(5)	439H33847	Z7 Coupler	(MS710C/D only)	1
	(6)	43B33914	Cover plate		1
	(7)	44B74002B	Joint plate		1
	(8)	449J84195	Semirigid cable	(MS710C/D only)	1
	(9)	439J33920	Semirigid cable	(MS710C/D only)	1
	(10)	449J74008	Semirigid cable		1
	(11)	439J33916	Semirigid cable	(MS710C/D only)	1
	(12)	449J84197 449J84194	Semirigid cable	(MS710C MS710D/E/F)	1
	(13)	449J74143B	Semirigid cable		1
	(14)	439J33917	Semirigid cable		1
	(15)	439J33918	Semirigid cable	(MS710C/D only)	1
	(16)	439J33919	Semirigid cable		1
	(17)	449J84196	Semirigid cable	(MS710C/D only)	1
	(18)	3NPS8B3+SW	Screw		24
	(19)	3NPS14B3+SW	Screw		1
	(20)	4NPS6B3+SW	Screw		1





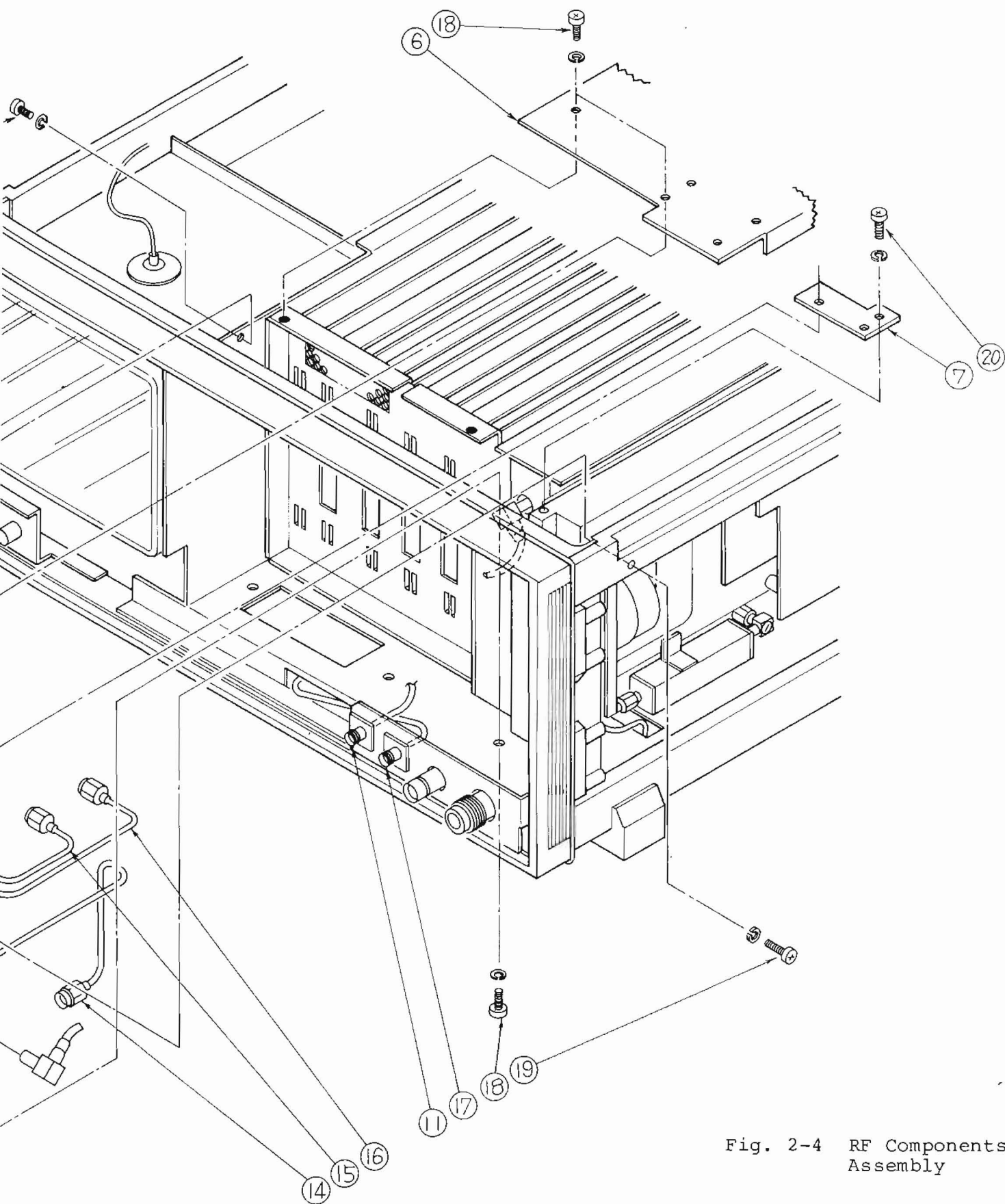


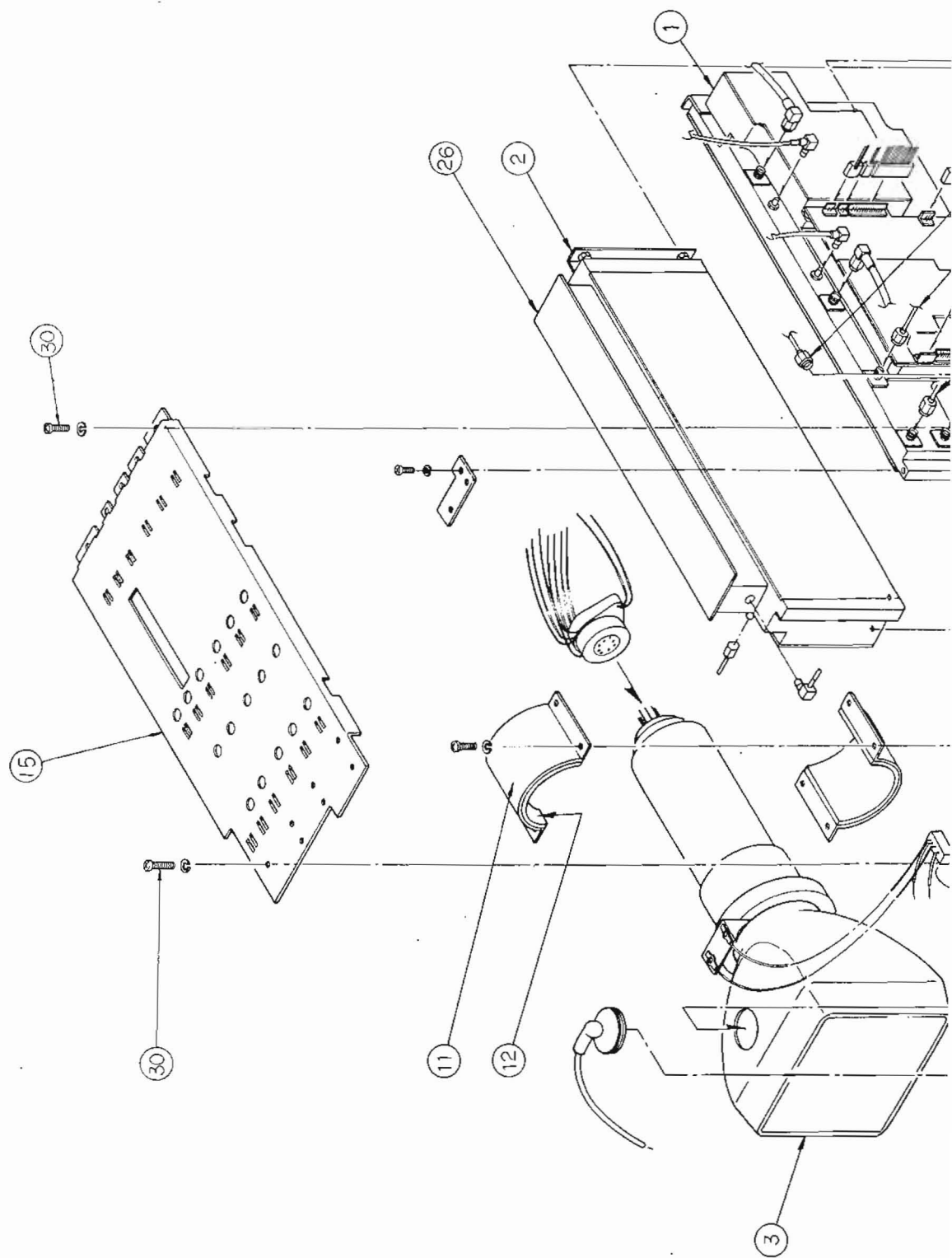
Fig. 2-4 RF Components Assembly

Table 2-5 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-5	(1)	329H9345C	Z14 0 to 2 GHz RF block		1
	(2)	329H8667	Z16 PLL block		1
	(3)	14V80089	CRT		1
	(4)		Z21 local control 1		1
	(5)		Z22 IF BPF/AMP 1		1
	(6)		Z24 local control 2	(MS710C/E only)	1
	(7)		Z23 IF BPF/AMP 2		1
	(8)		Z27 display control		1
	(9)		Z26 CPU board		1
	(10)		Z25 LOG/LIN AMP DETECTOR		1
	(11)	44B78070	Clamp		2
	(12)	34E67754A	Rubber spacer		2
	(13)	34E67754E	Rubber spacer		1
	(14)	34E67754F	Rubber spacer		2
	(15)	43B33914	Cover plate		1
	(16)	43B31520	Cover plate		1
	(17)	44B74002B	Joint plate		1
	(18)	449J84198 449J84194	Semirigid cable	(MS710C MS710D/E/F)	1

Table 2-5 Mechanical Parts List (continued)

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-5	(19)	439J33921	Semirigid cable		1
	(20)	439J33918 449J86184	Semirigid cable	(MS710C/D) (MS710E/F)	1
	(21)	439J33919	Semirigid cable		1
	(22)	439J33917	Semirigid cable		1
	(23)	439H26785	Z9 YTO		1
	(24)	439H26785	Z12 Filter		1
	(25)		Z10 YTO/YTF DRIVE		1
	(26)	44Y85780	Z18 μ 2nd converter 1 Z19 μ 2nd converter 2		1
	(27)	2.6NPS5B3+SW	Screw		7
	(28)	2.6NPS6B3+SW	Screw		4
	(29)	3FPS8B3	Screw		2
	(30)	3NPS8B3+SW	Screw		20
	(31)	3NPS14S7+SW	Screw		4
	(32)	4NPS6B3+SW	Screw		1
	(33)	4NPS8B3+SW	Screw		4
	(34)	4BPS8B3+WB	Screw		4



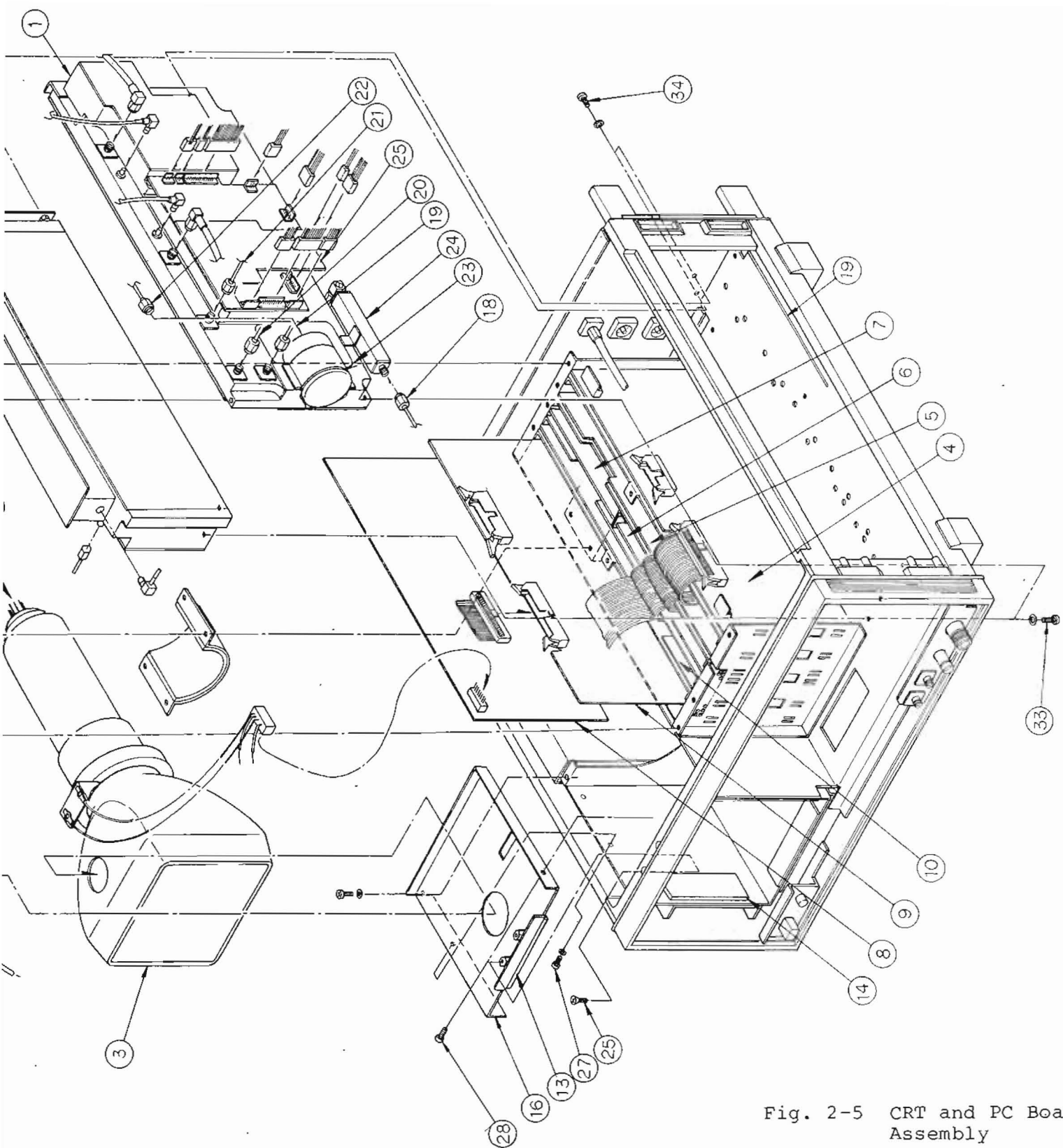
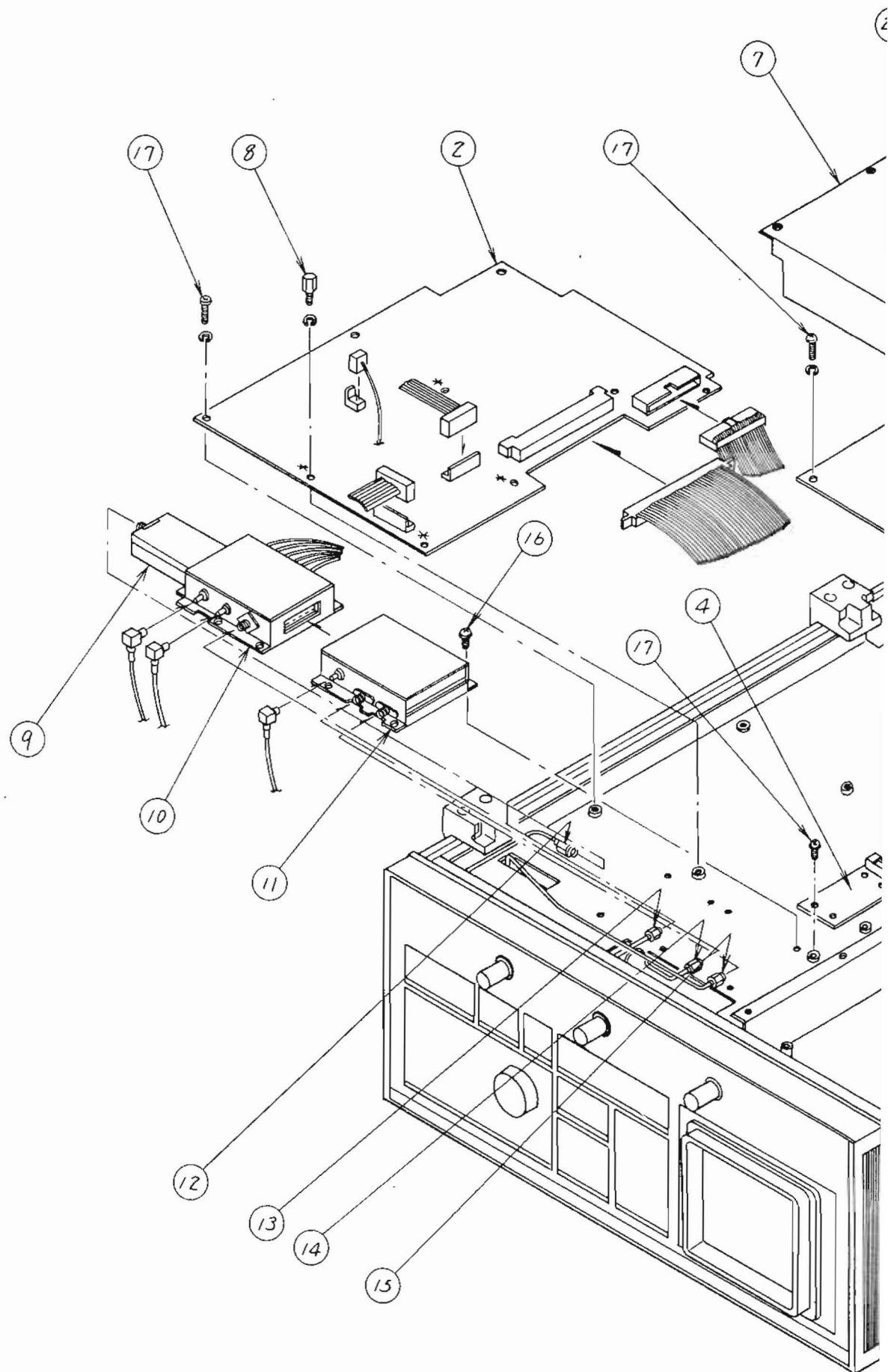


Fig. 2-5 CRT and PC Boards Assembly

2-21/(2-22 blank)

Table 2-6 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-6	①		Z30 CRT bias/ X-Y AMP		1
	②		Z34 digital memory/GP-IB		1
	③		Z32 switching regulator		1
	④		Z33 connection board		1
	⑤	33B5112B	Screw support		8
	⑥	43B28641	Protective board		1
	⑦	42B11719	Cover		1
	⑧	34H39505	Screw support		4
	⑨	449H83798	Diplexer	(MS710C/D only)	1
	⑩	44Y85778	Ext IF AMP	(MS710C/D only)	1
	⑪	44Y85779	Low 1st MIX	(MS710C only)	1
	⑫	449J84195	Semirigid cable		1
	⑬	449J84196	Semirigid cable	(MS710C/D only)	1
	⑭	449J84197	Semirigid cable	(MS710C only)	1
	⑮	449J84198	Semirigid cable	(MS710C only)	1
	⑯	2.6NPS6B3+SW	Screw		8
	⑰	3NPS6B3+SW	Screw		20
	⑱	3NPS8B3+SW	Screw		3
	⑲	3NPS16B3+SW	Screw		3
	⑳	3FPS6B3	Screw		8
	㉑	5NPS12S7+SW	Screw		1



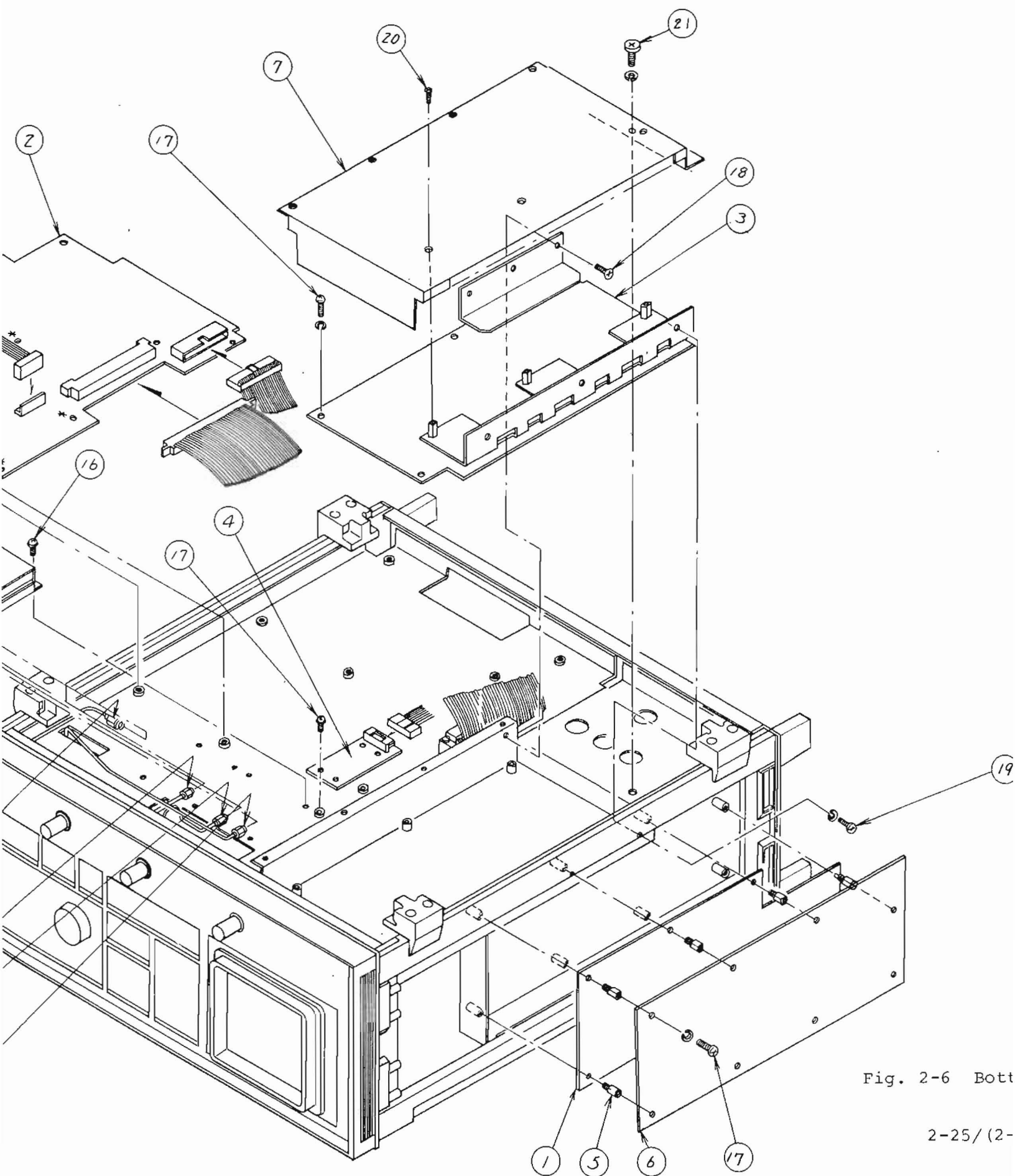
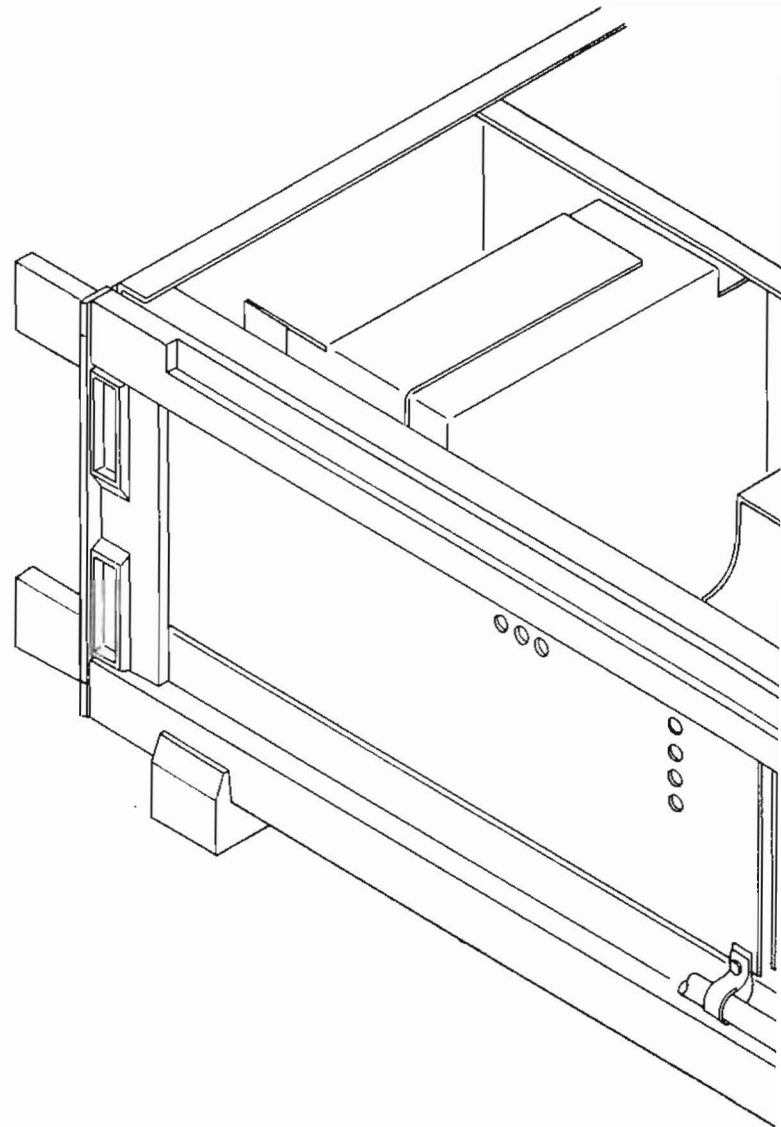


Fig. 2-6 Bott



Table 2-7 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-7	①	44Y85777	Low local block	(MS710C only)	1
	②	34H38590D	Spacer	(MS710C only)	2
	③	3NPS8B3+SW	Screw	(MS710C only)	2
	④	3NPS12B3+SW	Screw	(MS710C only)	2



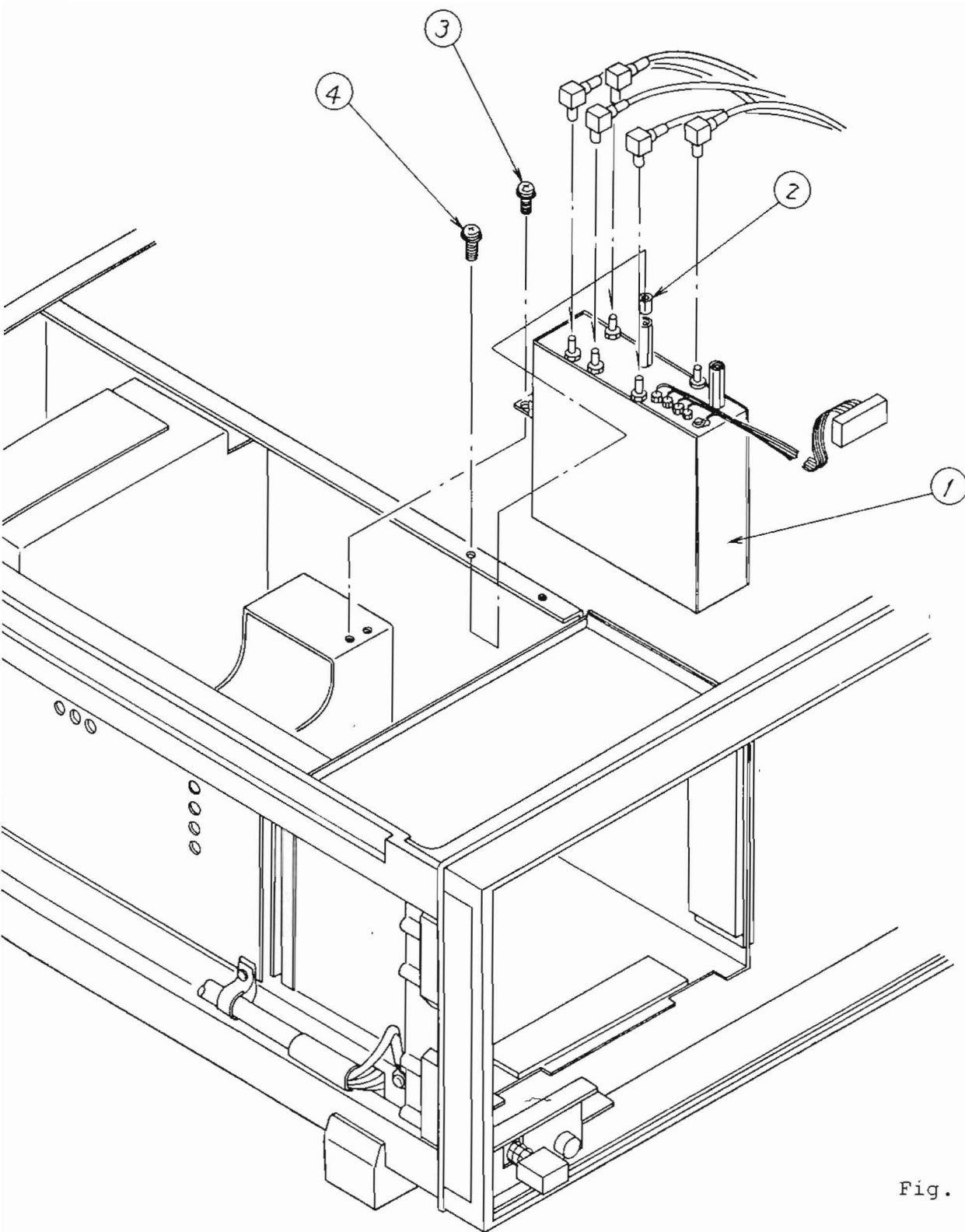
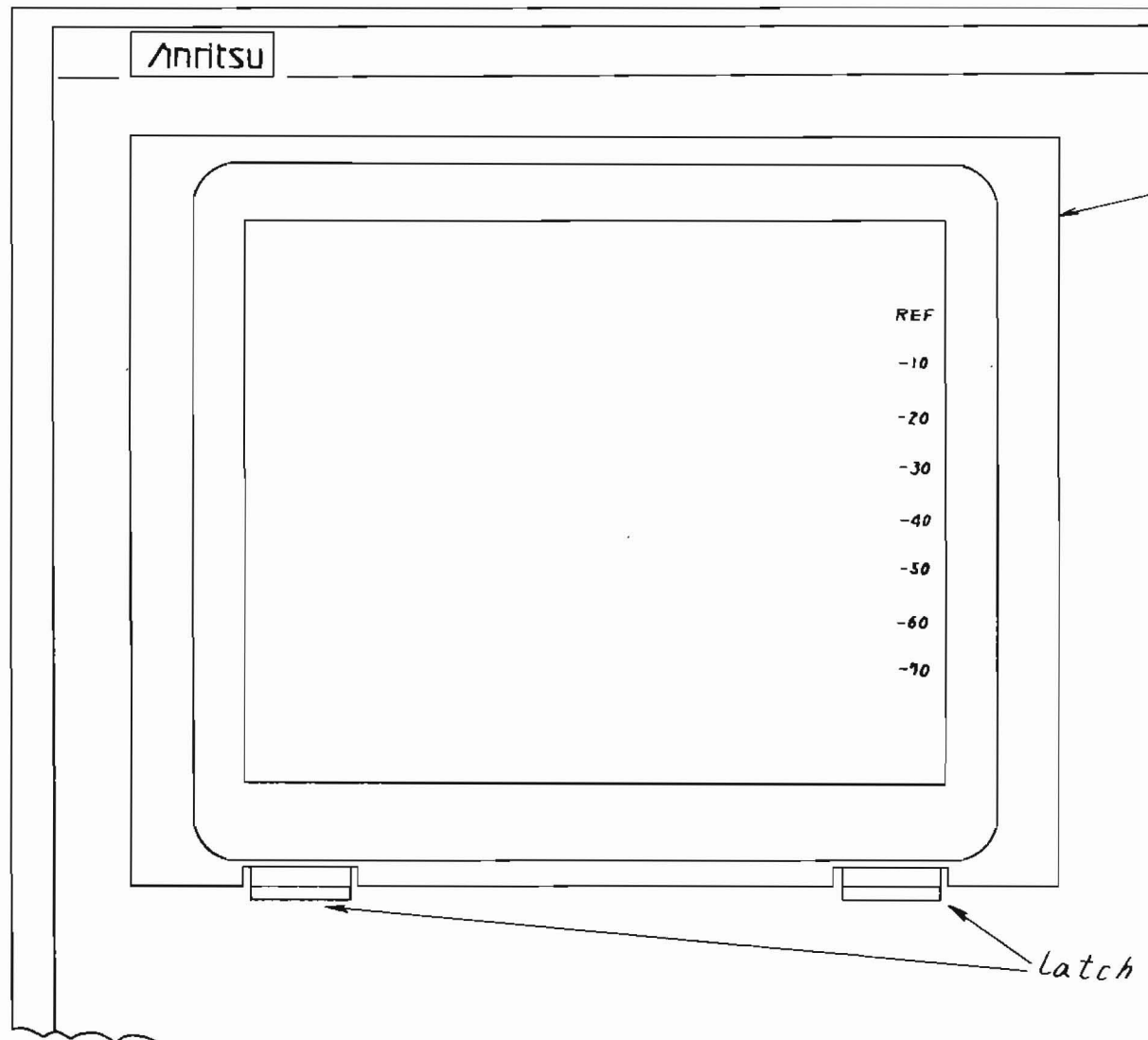


Fig. 2-7 Low Band Local Assembly

### 2.3 CRT Faceplate Cleaning Procedure

Step	Procedure
1	Turn off the power and remove the power cord from the ac outlet.
2	Lift the bezel latch with a fingertip and pull the bezel toward you.
3	Clean the CRT faceplate with a dry cloth.
4	Insert the tip of the bezel into the latch and push the lower side of the frame to lock the bezel.



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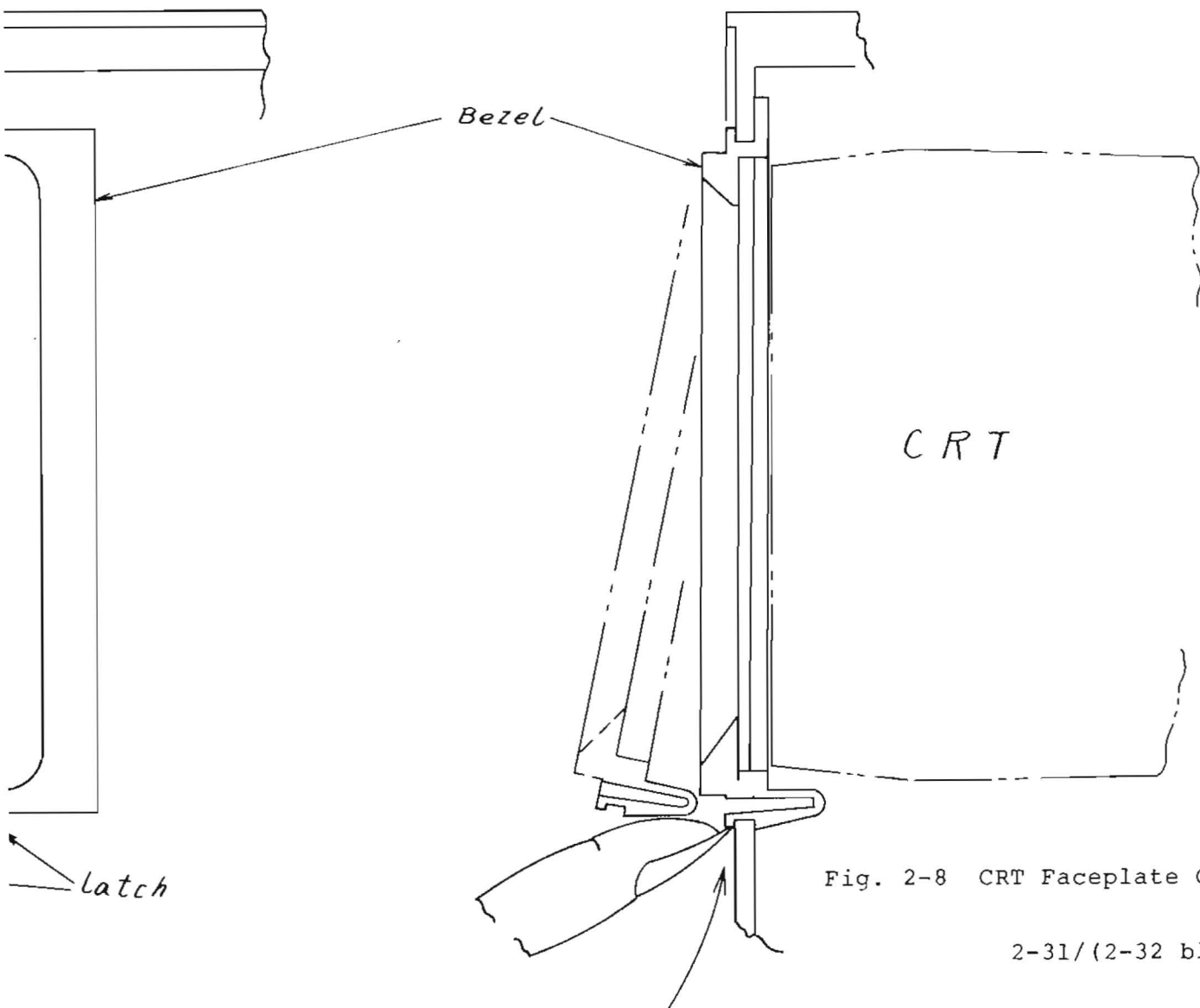


Fig. 2-8 CRT Faceplate Cleaning

2-31/(2-32 blank)

## SECTION 3

### OVERALL CIRCUIT DESCRIPTION

Refer to the Block Diagrams attached at the end of this section.

#### 3.1 Frequency Converters (Ref: Figs. 3-1, 3-2, and 3-3 (1/4))

The MS710[ ] is a swept front-end type superheterodyne spectrum analyzer. The relationship between the RF input frequency and the first local frequency is expressed by the following formula.

$$f_{RF} = N * f_{LO} \pm f_{IF}$$

$f_{RF}$  = RF input frequency     $f_{LO}$  = 1st local frequency  
 $f_{IF}$  = 1st IF frequency (2.5214 GHz or 521.4 MHz)

N is the ordinal number of the local harmonics used for the mixing. The mixing mode is expressed with this number and a plus or minus sign as 1-, 1+, 2-, ---.

The input RF signal in the 100 kHz to 2 GHz range is directed to the Z14 (0 to 2 GHz RF BLOCK) through the Z3 (RF ATT) and Z12 (2 GHz LPF). In this RF BLOCK, the RF signal is mixed with the first local signal of 2.5215 GHz to 4.5214 GHz, and converted to 2.5214 GHz first IF signal. This first IF signal goes to the 2nd converter through a Directional Filter, Preamplifier, and Bandpass Filter. At the 2nd Converter, the 2.5214 GHz IF signal is mixed with the 2nd local signal of 2.5 GHz and converted to the 21.4 MHz IF signal.

The RF signal in the 1.7 to 23 GHz range is directed to the Preselector (Z5 YTF) and then to the Z6 ( $\mu$  1st Converter). In this converter unit, the RF signal is harmonically mixed with the local signal of 2.2214 to 6.0000 GHz and converted to the first IF signal of 521.4 MHz.

The relationship between the RF INPUT FREQUENCY and the FIRST LOCAL FREQUENCY in each mixing mode is shown in Fig. 3-1 and Fig. 3-2. The 521.4 MHz IF Signal is applied to the  $\mu$  2nd Converter (Z18, Z19) and converted to a 21.4 MHz IF signal by mixing it with the 500 MHz 2nd local signal.

The differences in the first Converter efficiency for the different mixing modes are compensated by adjusting the IF amplifier gain in the  $\mu$  2nd converter 2 (Z19). The IF signal selection switches are also included in this unit.

Nominal loss or gain of each part is written in Fig. 3-3 (1/4). Overall conversion gain of these frequency converters is typically +7 dB.

The input RF signal in the 10 kHz to 30 MHz range of the MS710C is directed to the Z35 (low 1st MIX) through the Z3 (RF ATT). In Z35, after going through 30 MHz LPF, the RF signal is mixed with the first local signal of 521.4 MHz to 551.4 MHz, and converted to 521.4 MHz first IF signal.

This first IF signal, after passing the switch and IF AMP on the Z36 EXT IF AMP, is sent to the  $\mu$  2nd converter (Z18, Z19) and converted to a 21.4 MHz second IF signal in the same way as the 1.7 to 23 GHz range.

In the 18 to 140 GHz EXTERNAL MIXER mode of the MS710C/D, the RF signal input to the external mixer is mixed with the first local signal applied via the Z7 coupler and converted to a 521.4 MHz first IF signal.

Both two- and three-port mixers can be used with the MS710C/D. When the two-port mixer is used, the 521.4 MHz first IF signal is sent to the Z36 EXT IF AMP through the Z8 diplexer. When the three-port mixer is used, the 521.4 MHz first IF signal is sent to the Z36 EXT IF AMP through the EXTERNAL MIXER IF INPUT connector.

One of these 521.4 MHz IF signals is selected by the Z36 EXT IF AMP and sent to the  $\mu$  2nd converter (Z18, Z19) via the IF AMP in Z36 in the same way as the 1.7 to 23 GHz range.

### 3.2 IF Section (Ref: Fig. 3-3 (2/4))

The 21.4 MHz IF signal from the frequency converters is applied to the Z22 IF BPF/AMP 1.

In Z22, the IF signal goes to the two-stage variable bandwidth BPF circuit which sets the resolution bandwidth (RBW) after passing the level calibration attenuator and buffer amplifier. This BPF circuit operates with the subsequent three-stage variable bandwidth BPF circuits to determine the MS710[ ] sensitivity and RBW when the RBW to be set is from 300 kHz to 3 MHz.

The output IF signal of the BPF is switched to one of the two routes according to the RBW setting value after passing the variable gain amplifiers.

When the RBW setting value is less than or equal to 100 kHz, the 21.4 MHz IF signal is mixed with the 19.9 MHz signal and down-converted to a 1.5 MHz signal. This signal goes to the variable gain amplifiers and variable bandwidth BPF circuits which determine the sensitivity and the resolution bandwidth of the analyzer when the RBW setting is between 100 Hz to 100 kHz. Then it is mixed with the same 19.9 MHz signal again and up-converted to the 21.4 MHz IF signal. This reconverted signal is applied to the three-stage BPF circuit whose bandwidth is selectable from 300 kHz to 3 MHz.



When the RBW setting is more than or equal to 300 kHz, the above Down and Up converting processes are bypassed and the input IF signal is directly applied to the three-stage BPF circuit.

The band-limited and level-controlled IF signal is applied to the LOG/LIN amplifier in the Z25. This LOG/LIN amplifier consists of seven amplifier stages and works as a 70 dB log-amplifier or a 10 to 40 dB step gain linear amplifier according to the control signal. After amplification, the IF signal is detected to produce the video signal which is the vertical signal of the analyzer. The detected signal or the video signal goes out to the video signal processing section through the video filter, scale attenuator, and buffer amplifiers. Their sample and hold circuits are used to hold the video signal level when the mixing mode is changed.

### 3.3 Video Signal Processor and Display Control (Ref: Fig. 3-3 (3/4))

Only when the analyzer is set to the zero-span mode and a fast sweep time of less than 2 ms/div, the video signal is directly sent to the vertical deflection amplifier in the Z30 for the CRT display.

In all other cases, the video signal is sampled or digitized in the Z34 synchronized with the sampling pulses from the sweep signal generator circuit in the Z26. This sampling is managed by a microprocessor in the Z34 and the digitized video signal data are stored in the display RAM in the Z27. The stored data with other character data are readout with a constant refresh rate by the display control circuit to display them on the CRT.

### 3.4 Local Control Section (Ref: Fig. 3-3 (4/4))

The first local signal of the MS710[ ] is generated by a 2.2 to 6 GHz YIG Tuned Oscillator (Z9 YTO) except for the 10k-30MHz Band of the MS710C. The frequency and sweep width (span) is controlled, using the control circuits in the Z21, by the main microprocessor in the Z26.

To obtain accurate frequency settings, a phase lock loop (PLL) technique is used. For wider spans, the phase lock loop is closed in each sweep reset period to correct the center frequency, and then opened to make a wide frequency sweep. For the narrower spans, the phase lock loop is always closed and the reference oscillator is swept to get a stable swept frequency signal.

When the sweep width\* is set to wider than 2 GHz by using START-STOP frequency settings, the first local frequency is swept by the output of the Main Tune D/A converter in the Z21 which is directly controlled by the main microprocessor in the Z26. In this sweep mode, when the local frequency comes to the upper end of the YTO (6 GHz), the harmonic mixing mode is automatically changed. Frequency correction by the PLL is used at the start frequency in each mixing mode. The relationship between the RF frequency and the first local frequency in each mixing mode is shown in Fig. 3-1.

When the sweep width\* is less than or equal to 2 GHz, the Main Tune D/A converter is set to the fixed value corresponding to the center frequency. The sweep ramp signal from the generator in the Z26 is used to sweep the YTO as described below. In this sweep mode, the mixing mode is never changed in a sweep because of the 2 GHz overlap at each mixing mode end. The relationship between the RF frequency and the first local frequency is shown in

Fig. 3-2. As far as the YTO can cover the whole sweep width, the lowest mixing mode is chosen in the range where the RF frequency overlaps. This is why the conversion loss is less in the lower mixing mode.

When the sweep width\* is between 2 GHz and 21 MHz, the sweep signal from the Z26 is added to the main tune voltage through the Span Control Attenuator. This swept tuning voltage is applied to the YTO main coil to get a swept frequency signal. When the sweep width\* is between 20 MHz and 1.01 MHz, the sweep signal is applied to the FM coil of the YTO while the main tune voltage is fixed to the center frequency value to get a stable narrow span swept signal. In both cases the center frequency is corrected in the sweep reset period by the PLL.

When the sweep width\* is less than 1 MHz, the PLL is always closed and the reference oscillator for the PLL is swept.

The simplified block diagram of this PLL circuit and formulae for the frequency at each section are shown in Fig. 3-4.

A part of the first local signal is branched by couplers and applied to the PLL Block (Z16). In this block, the local signal is applied to the sampler (Z16-Z3). At the sampler it is mixed with the high ordinal (16th to 47th) harmonics of the sampling signal which is generated at the M/N VCO (Z16-Z6) and divided by 8 at the pulse amplifier (Z16-Z5). At the YTO PD circuit (Z16-Z9) the difference frequency signal from the sampler is phase locked to the 17.4 MHz reference signal which is generated by the REF VCO and divided by 8 in the Z21. The correction voltage for the center frequency is held in a sample and hold circuit (a part of Z16-Z10) while the wide sweep is operating.

As the frequency of the M/N VCO is controlled by a sub PLL circuit precisely according to the equation shown in Fig. 3-4, the center frequency can be determined with an accuracy of  $\pm 30$  kHz, except for sweep signal error. The sub PLL circuit for the M/N VCO consists of the 5 x 100 MHz (Z16-Z8), M/N MIX (Z16-Z7), M/N PD (part of Z16-Z10) and a clock oscillator with programmable divider in the Z26.

All the internal settings and controls for these circuits in the PLL are managed by the main microprocessor.

The preselector (Z5 YTF; YIG Tuned Filter) tuning signal is generated in the Z21 by using the main tune signal and the information for the harmonic mixing mode. The mixer bias for the  $\mu$  1st converter and IF gain control signal for loss compensation at the  $\mu$  2nd converter (2) is also supplied from the circuit in the Z21.

\* The term "Sweep Width" refers to the "Sweep Width of the first local oscillator." This is equal to the "span" set by the front panel operation only when the fundamental mixing mode (1+ or 1-) is used. When a higher mixing mode is used, the "Sweep Width" is equal to the value of "span divided by the harmonic number." For example, when the 4+ mode is used, the sweep width is only 500 MHz even if the span is set to the 2 GHz or 200 MHz/div by a panel operation.

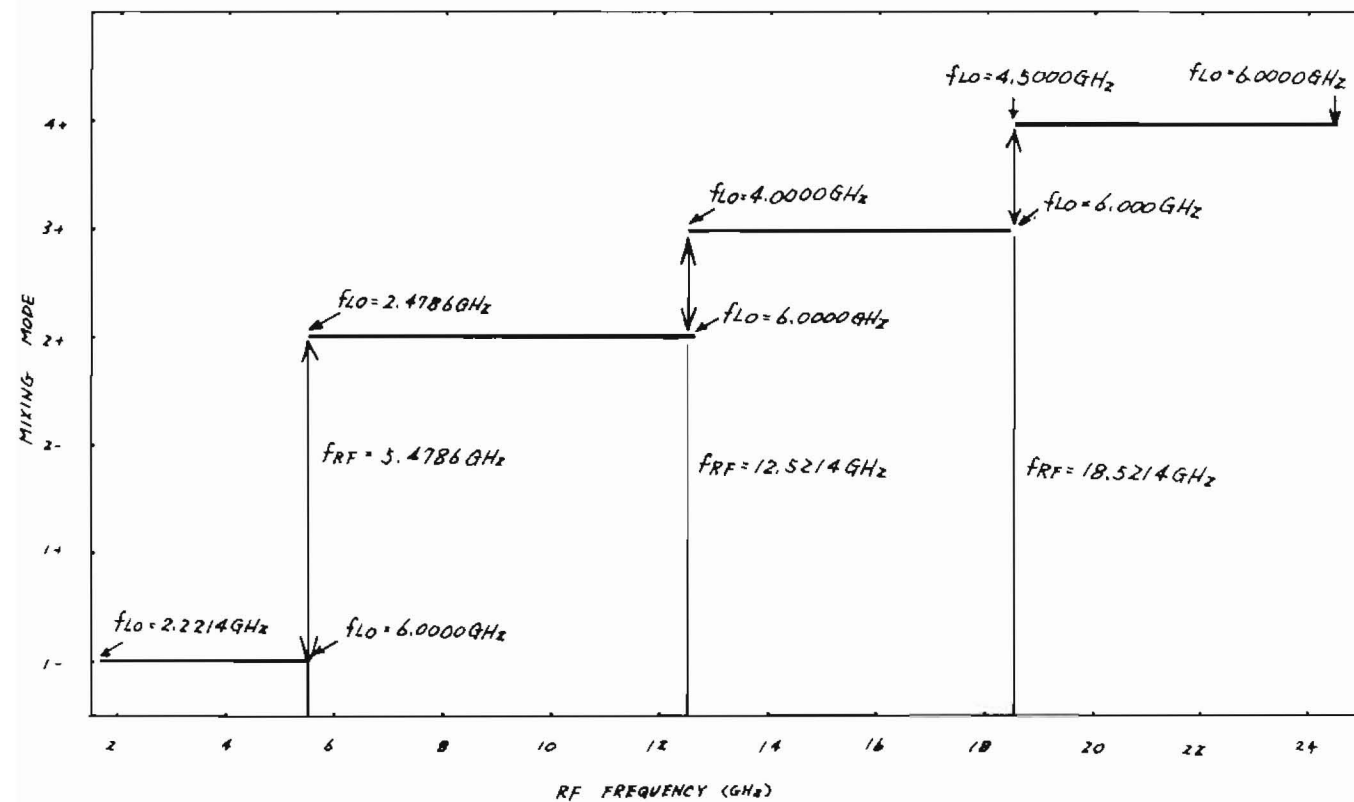


Fig. 3-1 Harmonic Mixing Mode Change for Span > 2 GHz  
(200 MHz/div)

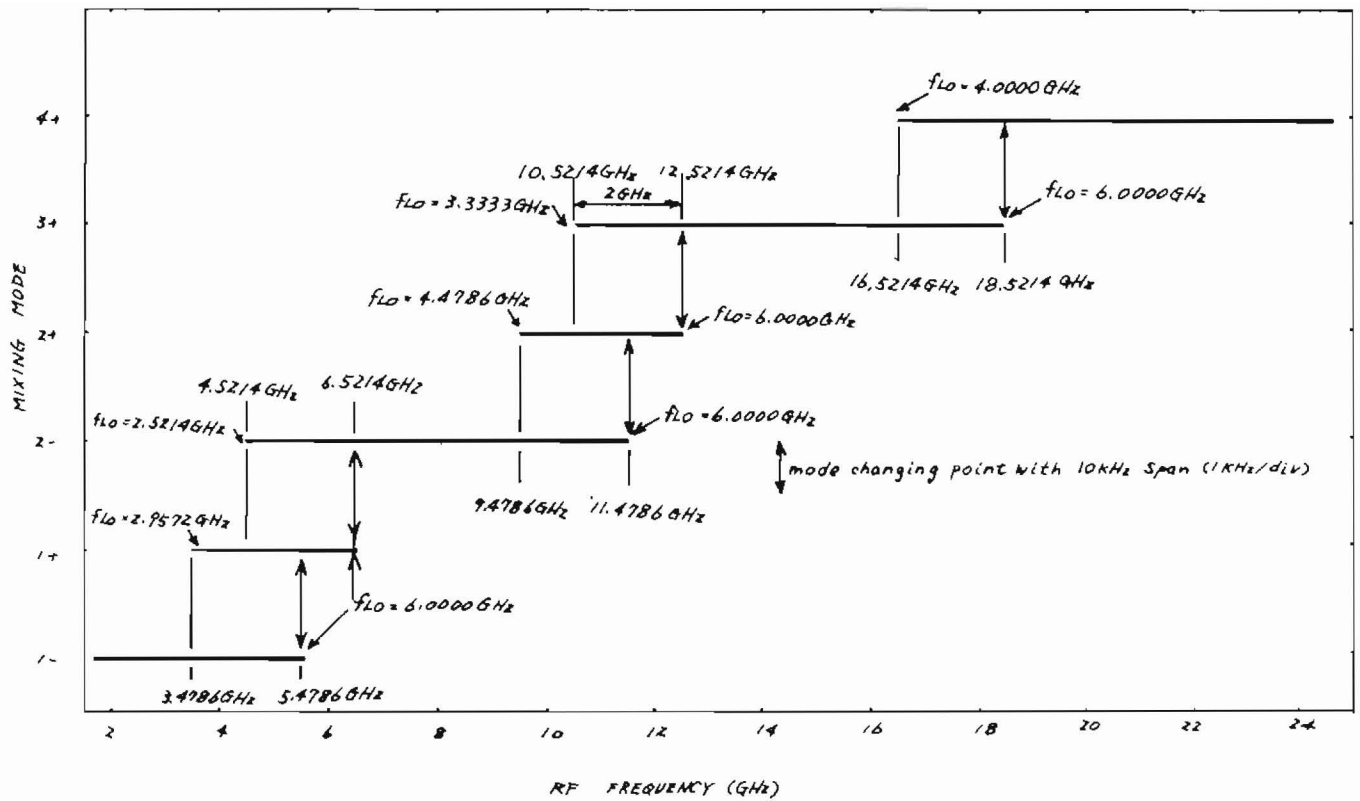
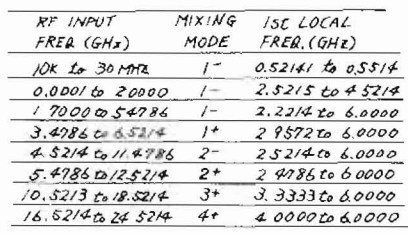
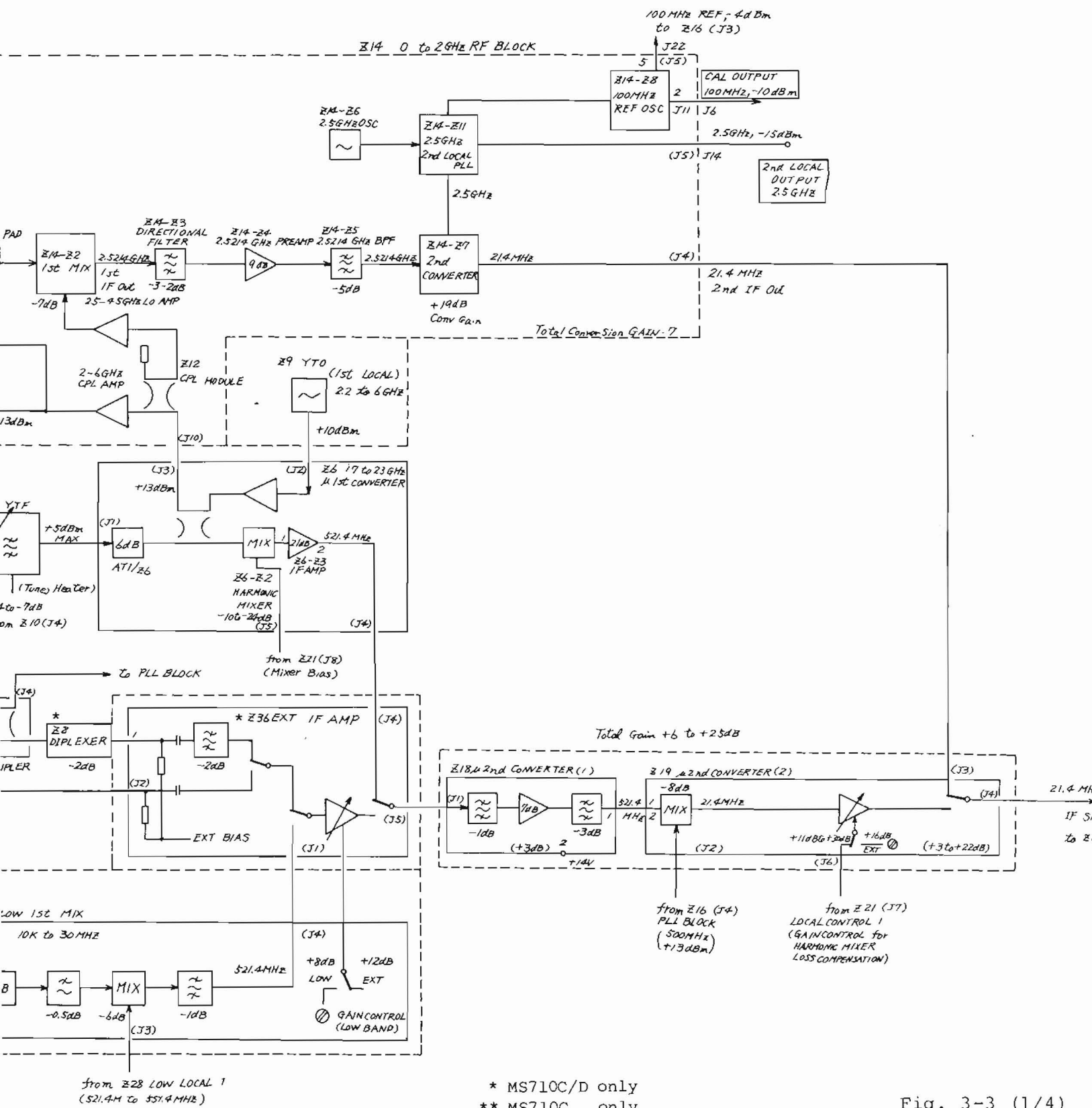


Fig. 3-2 Harmonic Mixing Mode Change for Span  $\leq 2 \text{ GHz}$   
( $\leq 200 \text{ MHz/div}$ )



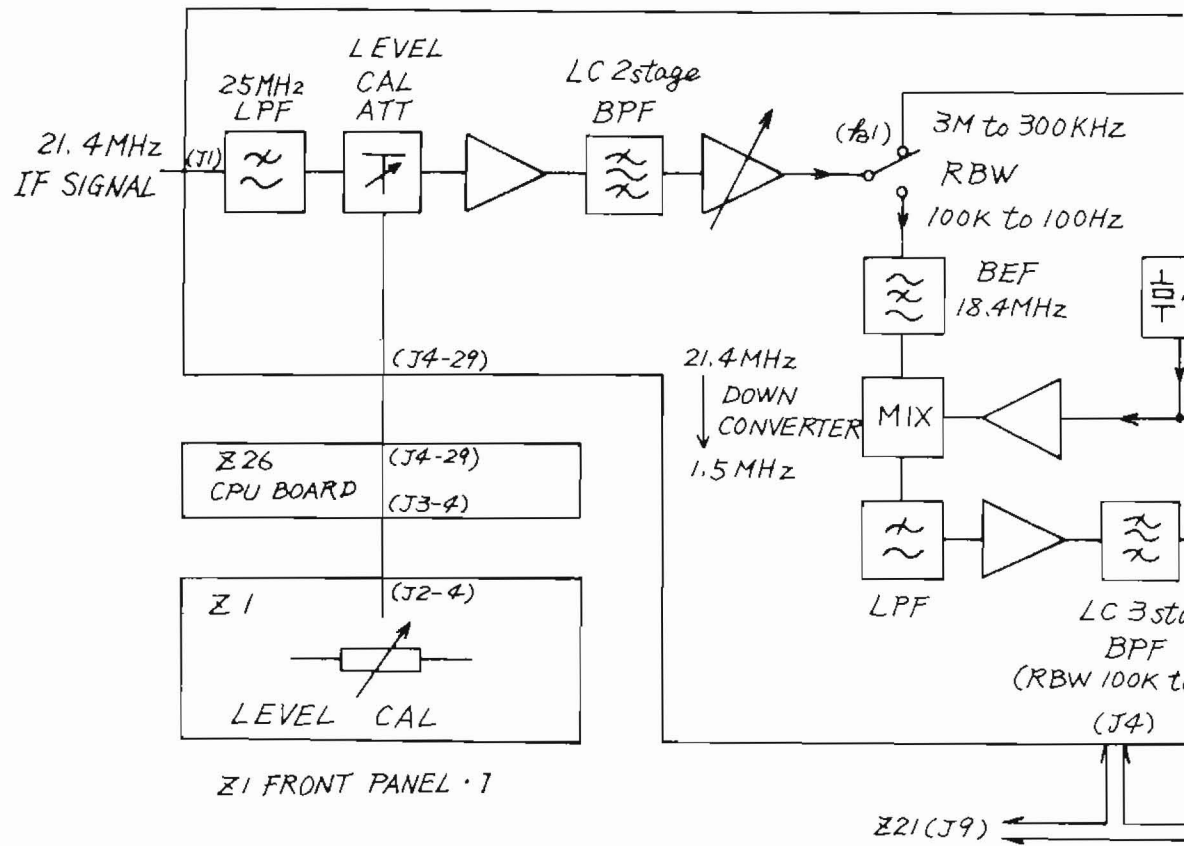


\* MS710C/D only  
\*\* MS710C only

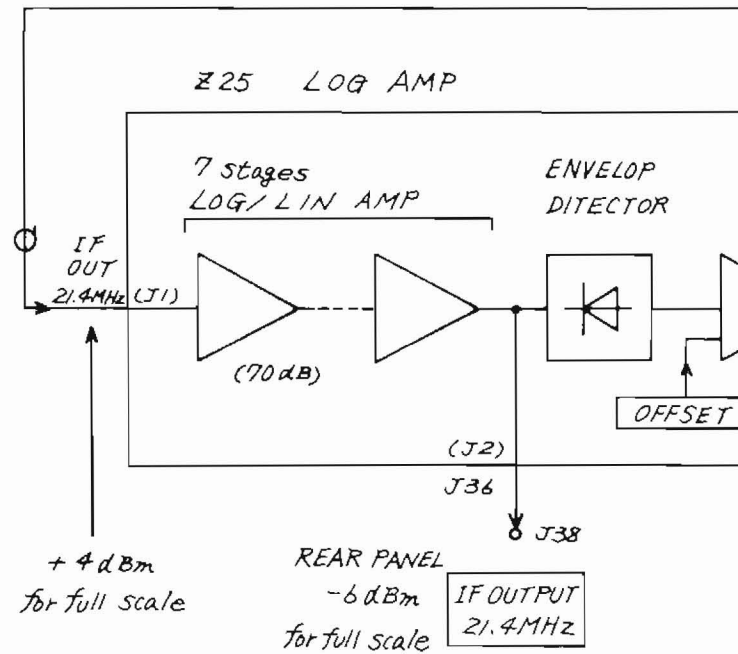
Fig. 3-3 (1/4)  
MS710[ ] Block D  
(Frequency Conve



## Z22 IF BPF / AMP 1



Z1 FRONT PANEL · 1



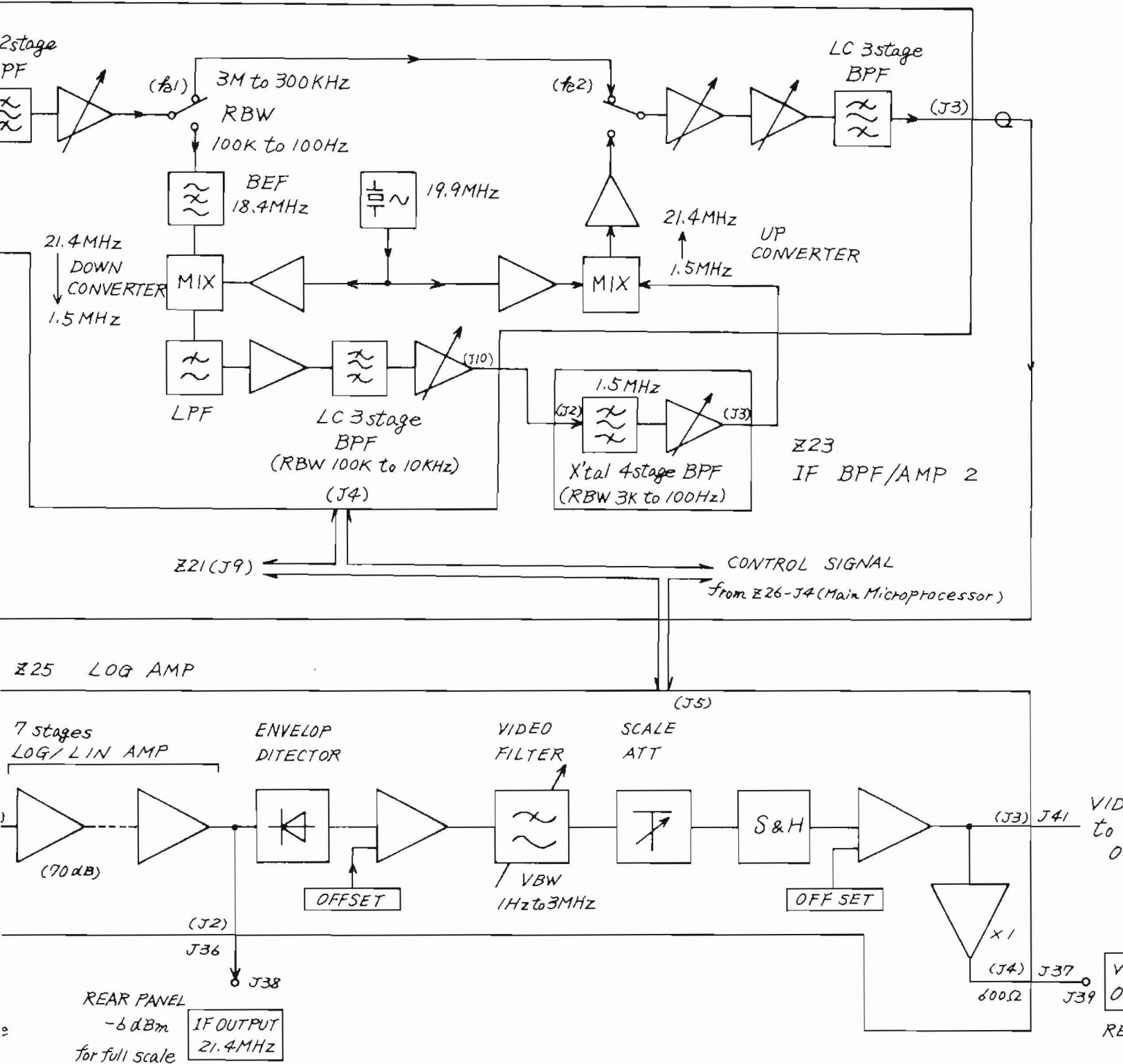
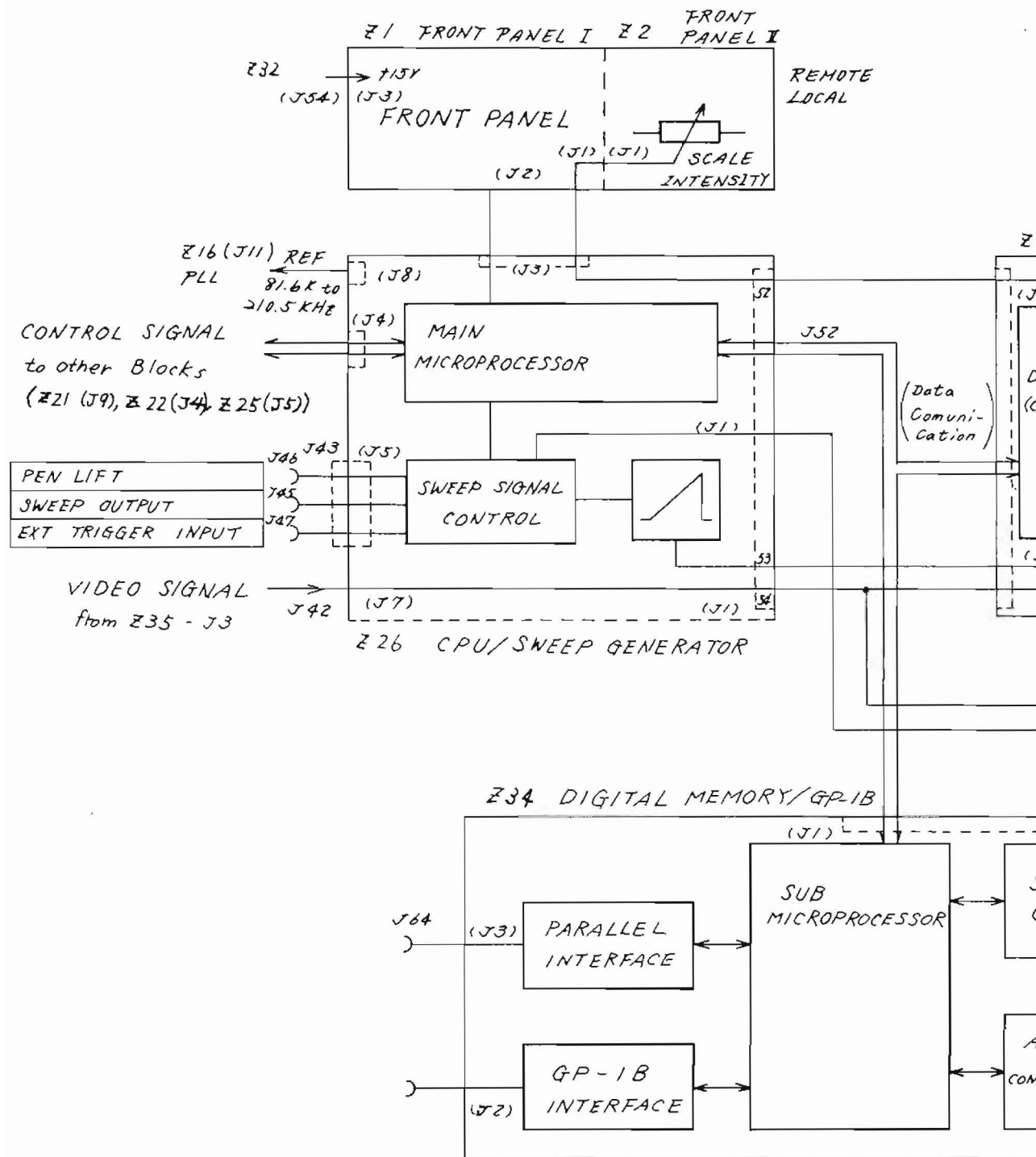


Fig. 3-3 (2/4)  
MS710[ ] Block Diagram  
(IF Section)



REMOTE  
CAL

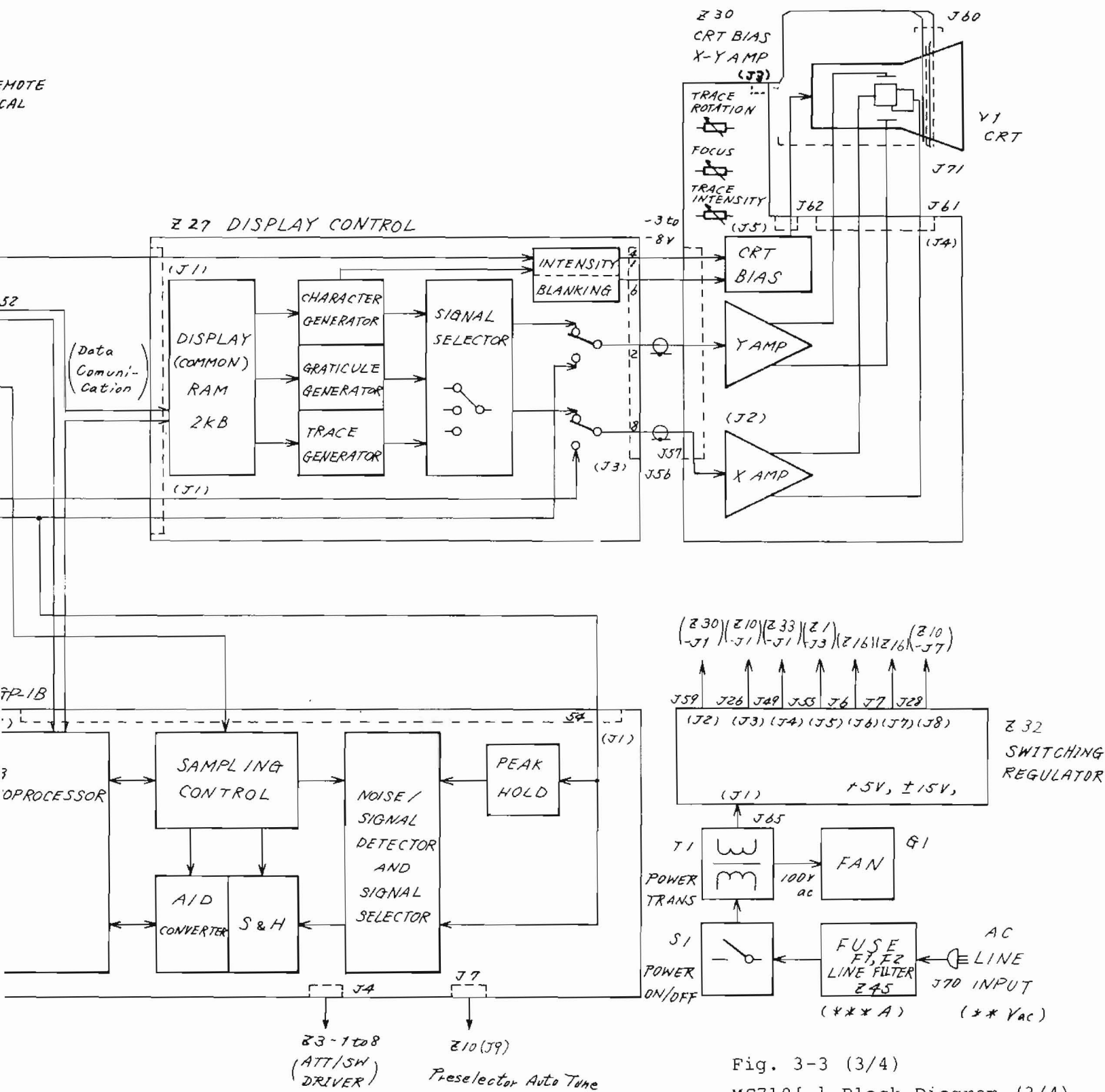
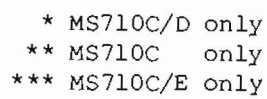


Fig. 3-3 (3/4)

MS710[ ] Block Diagram (3/4)  
(Video Signal Processor  
and Display Control)





When PLL Closed

(Normal Band)

$$f_{M/N} = 1000 + 16 \frac{M}{N} \text{ (MHz)}$$

$$f_{LO} = f_{REF} + \frac{N+f_{M/N}}{8}$$

$$= f_{REF} + 125N + 2M \text{ (MHz)}$$

N (= 16 to 47) and  
M (= 50 to 112) are chosen  
to the appropriate value  
by the microprocessor

Example:

If  $f_{RF} = 3000$  MHz  
then  $f_{LO}$  must be  
 $3.000 + 521.4 = 3521.4$  MHz

In this case

N = 27, M = 64 are used

resulting for  $f_{REF} = 18.4$  MHz,

$$f_{LO} = 18.4 + 125 \times 27 + 2 \times 64 \\ = 3521.4 \text{ (MHz)}$$

By changing the M by one,  
 $f_{LO}$  can be changed exactly  
by 2 MHz.

For the fine tuning between  
these 2 MHz steps, fine  
frequency tuning of REF VCO  
( $f_{REF}$ ) is used.

(Low Band) \*\*

N = 16 (fixed)

$$f_{M/N} = 1000 + M \text{ (MHz)}$$

$$2 \cdot f_{LLO} = f_{REF} + f_{M/N}$$

$$f_{LLO} = \frac{1}{2} (f_{REF} + f_{M/N}) \text{ (MHz)}$$

M (= 34 to 94) are chosen  
to the appropriate value  
by the microprocessor

Example:

If  $f_{RF} = 15$  MHz

then  $f_{LLO}$  must be

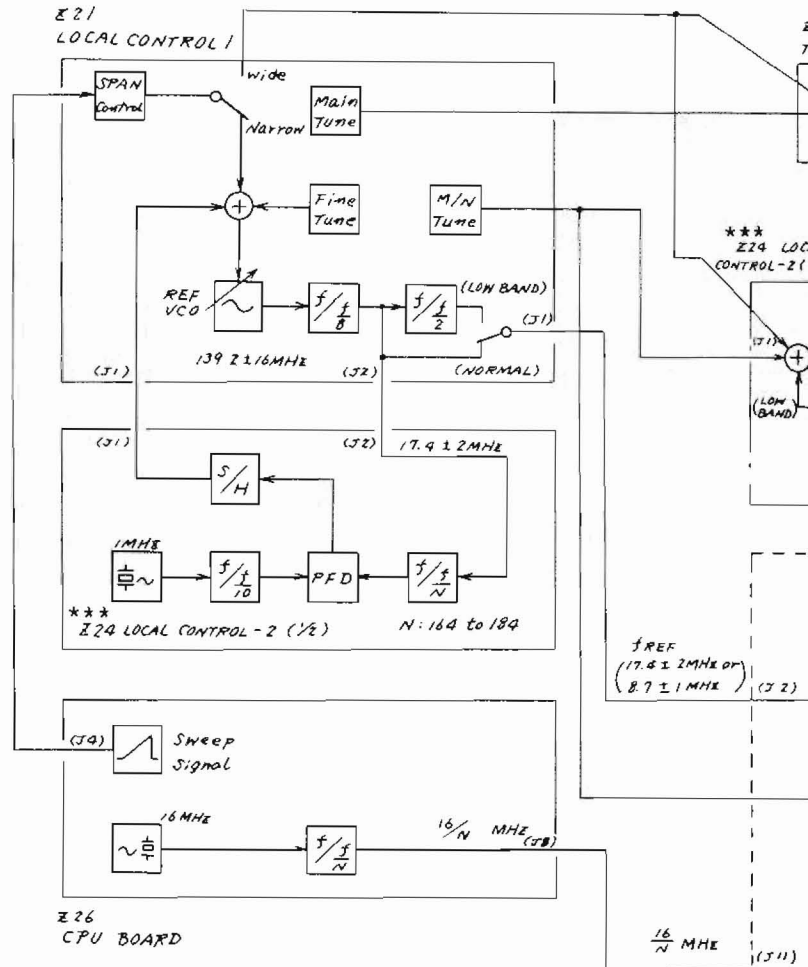
$$15 + 521.4 = 536.4 \text{ MHz}$$

In this case

M = 64 is used

resulting for  $f_{REF} = 8.8$  MHz

$$f_{LLO} = \frac{1}{2} (8.8 + 1064) \\ = 536.4 \text{ MHz}$$



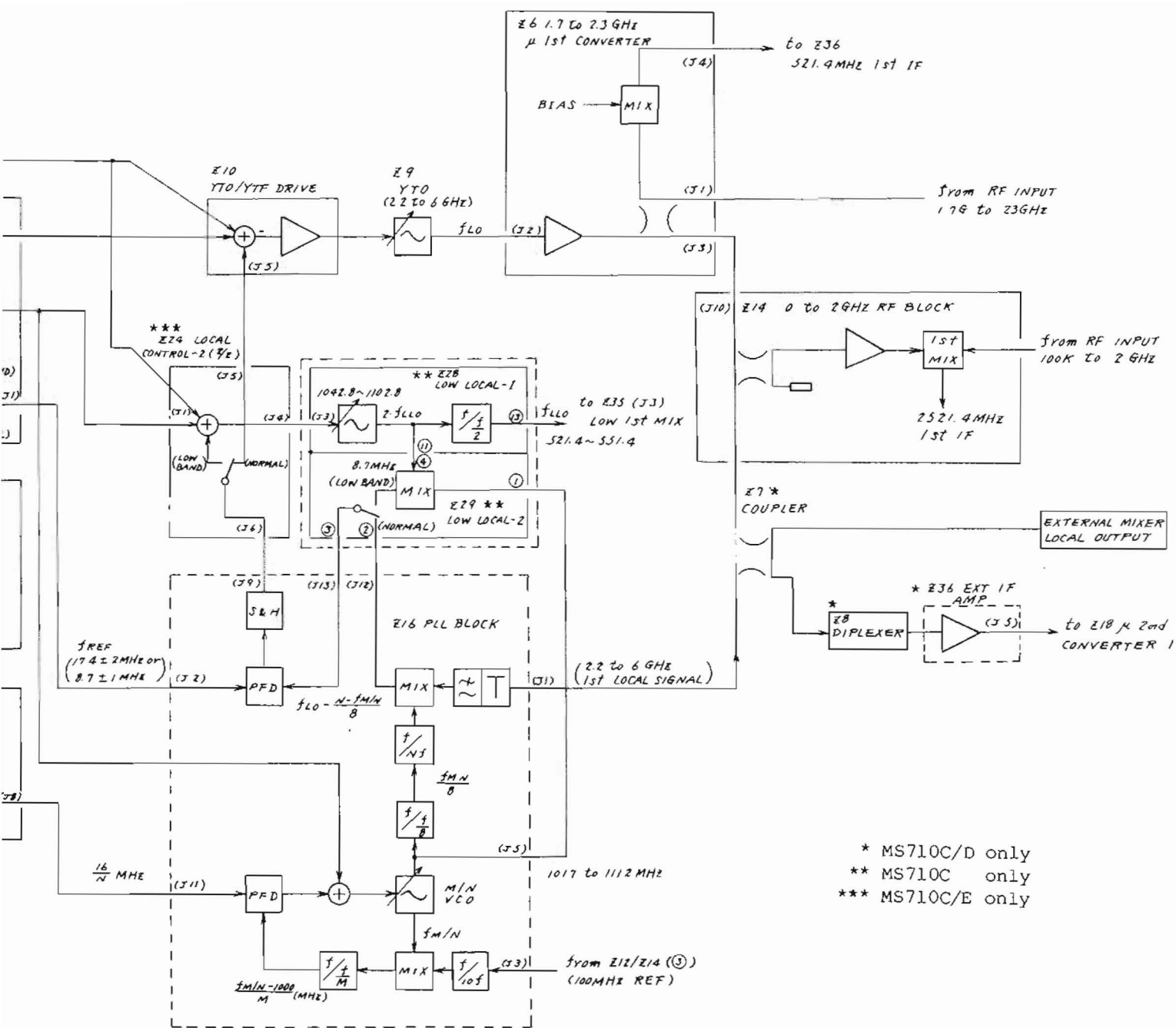


Fig. 3-4 PLL CIRCUIT  
Simplified  
Block Diagram



## SECTION 4

### OVERALL TROUBLESHOOTING

Refer to the MS710[ ] circuit diagram attached at the end of this section.

#### 4.1 Introduction

This section explains which part (up to the block level) is to be checked according to the failure symptoms. Refer to the circuit explanations in Section 3 before troubleshooting, because the entire signal flow must be fully understood beforehand.

## 4.2 Troubleshooting

### 4.2.1 Faulty block location troubleshooting

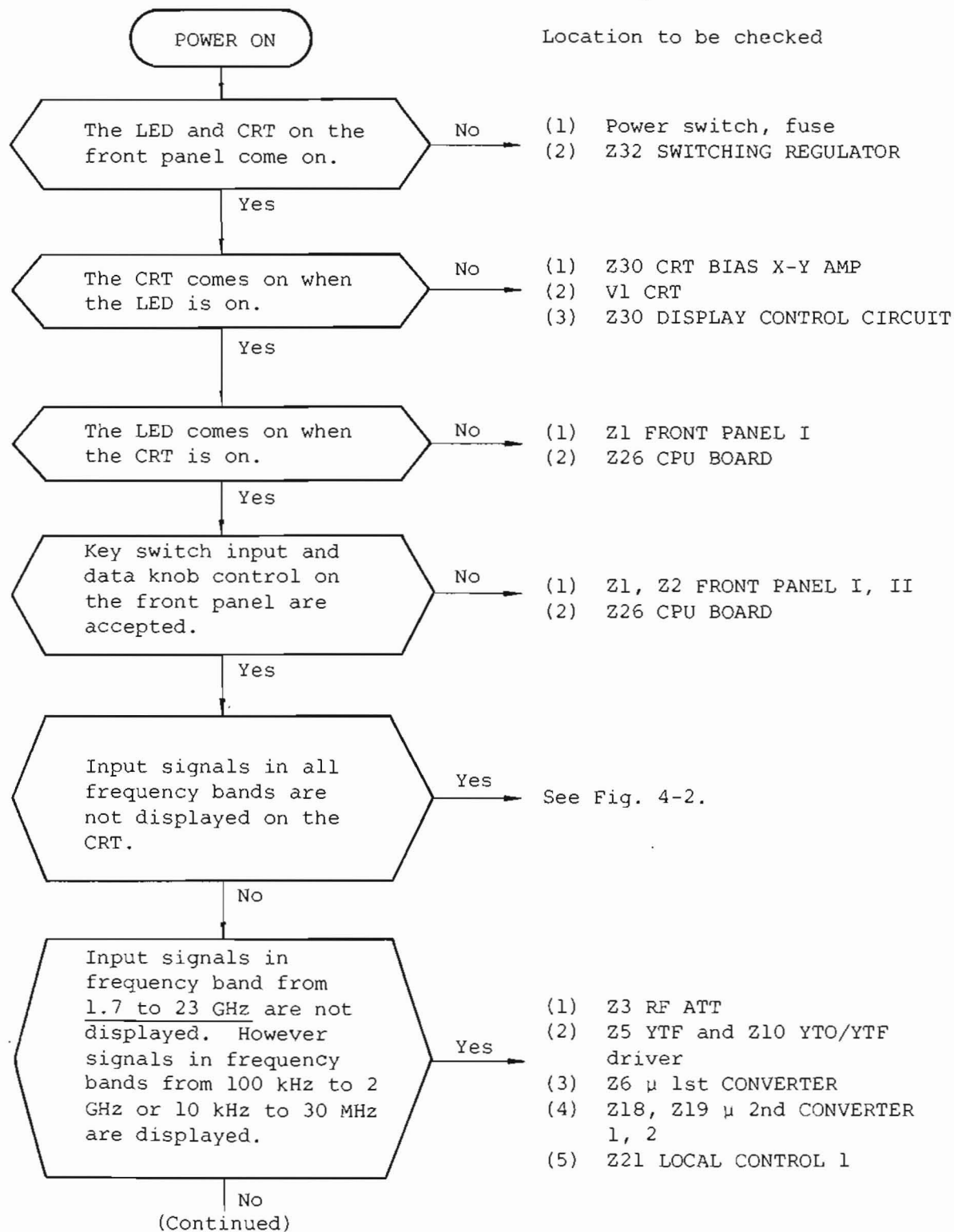


Fig. 4-1 (1/2) Faulty Block Location Troubleshooting Flowchart

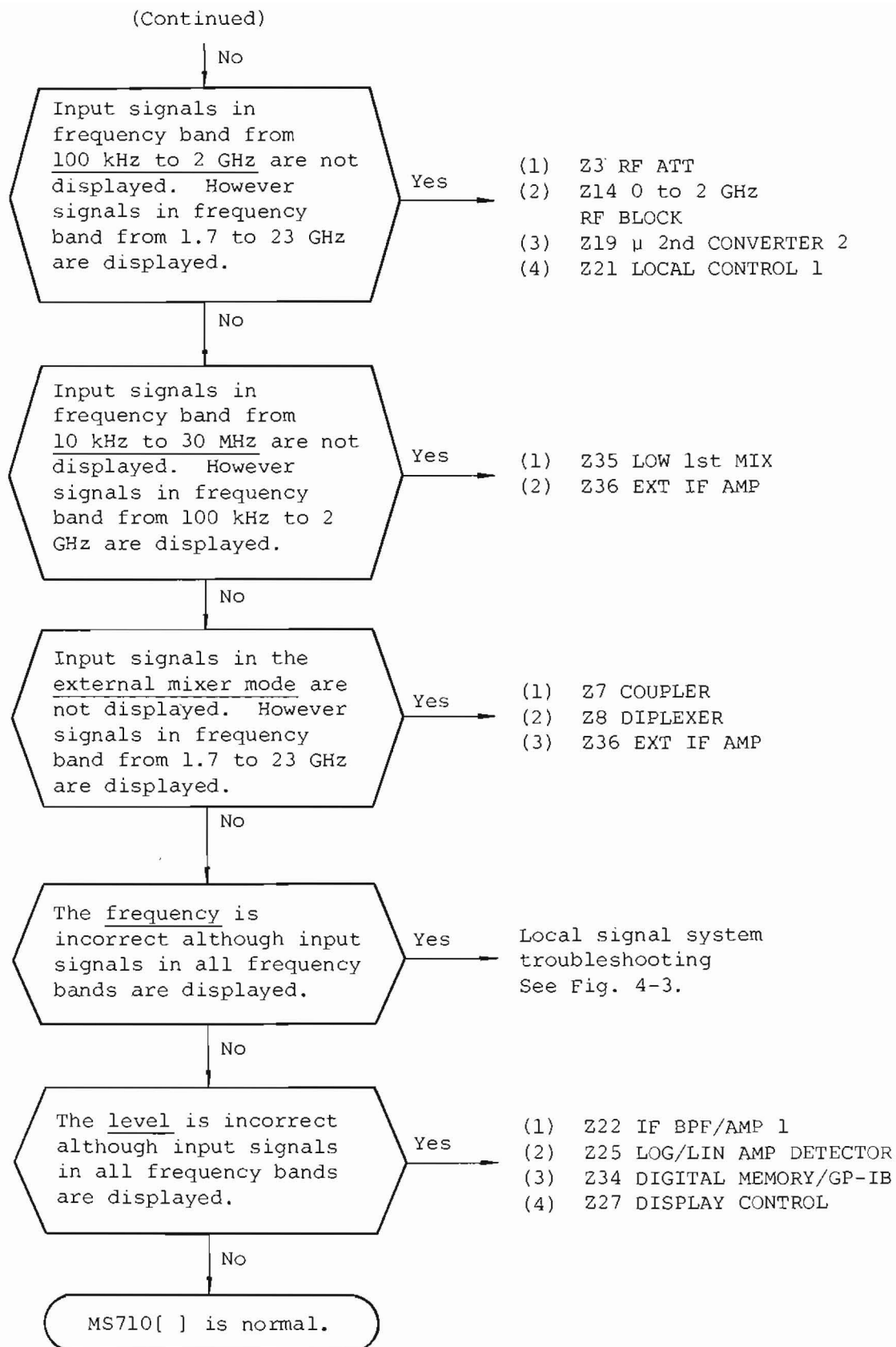


Fig. 4-1 (2/2) Faulty Block Location Troubleshooting Flowchart

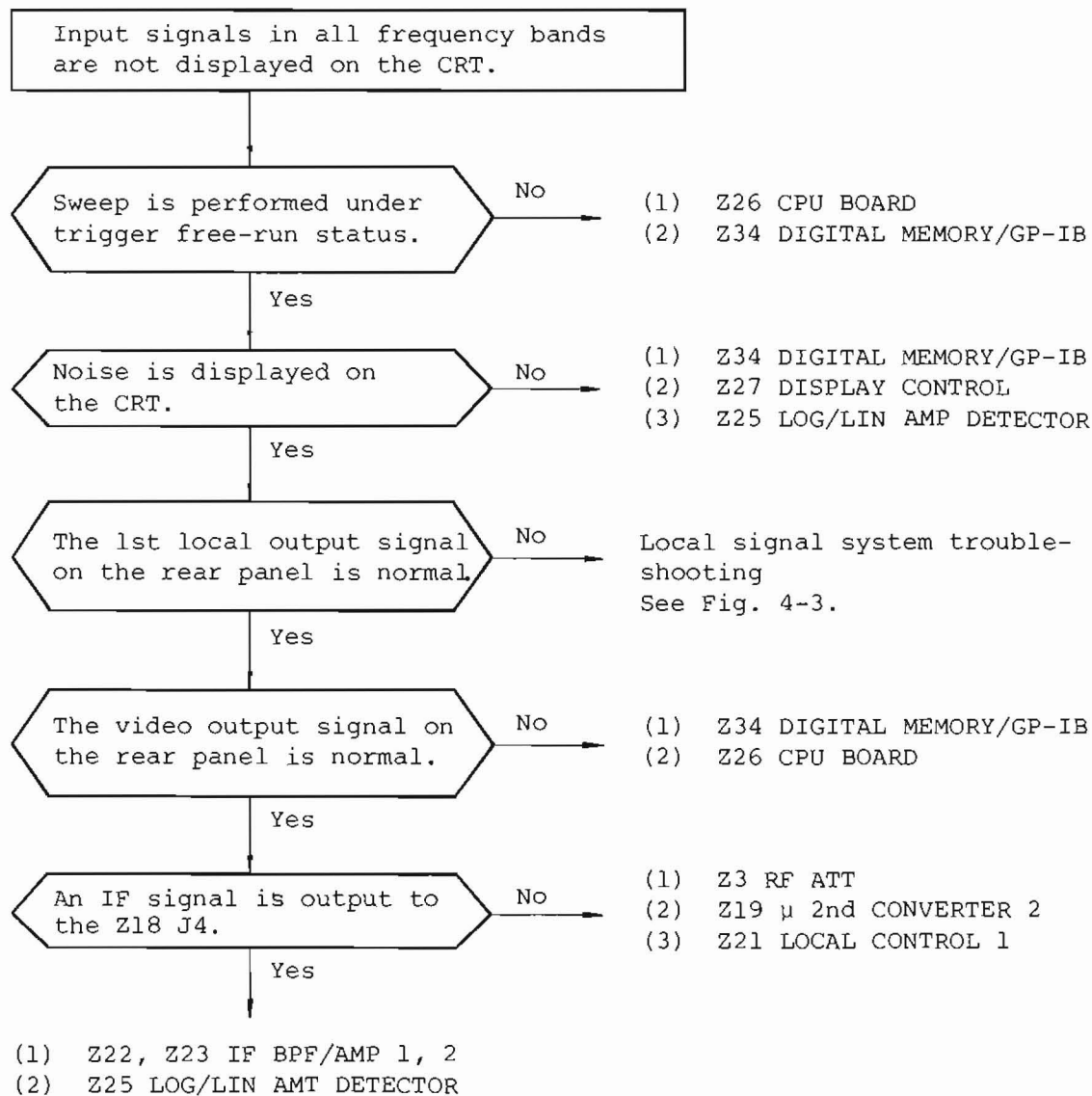


Fig. 4-2 Troubleshooting Flowchart (When Input Signals In All Freq. Bands [10 k to 30 MHz, 100 k to 2 GHz, 1.7 to 23 GHz] Are Not Displayed.)

#### 4.2.2 Local signal system troubleshooting

(Ref. Figs. 3-3 (4/4) & 3-4)

As explained in paragraph 3.4, many parts are related to the MS710C local signal control system. Simplified troubleshooting can be done according to the following procedures:

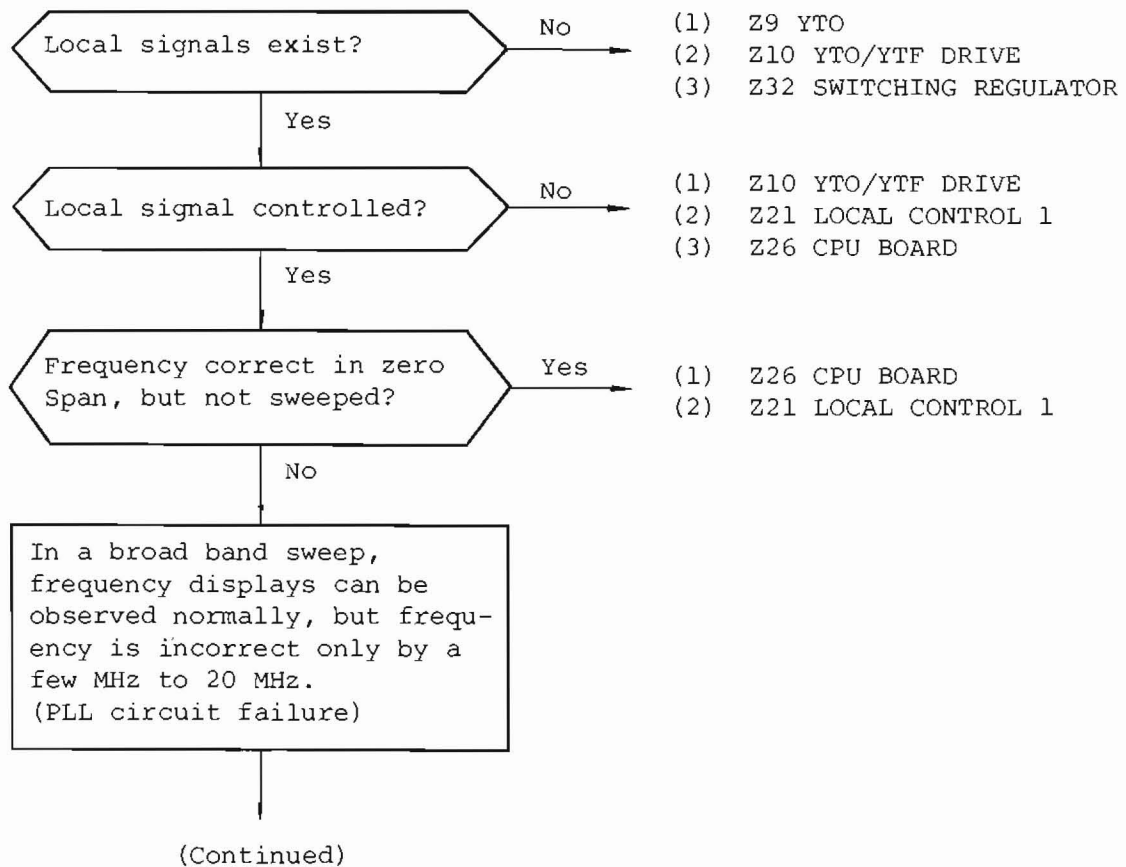


Fig. 4-3 (1/2) Troubleshooting Flowchart  
(When Local Signal System Is Faulty)

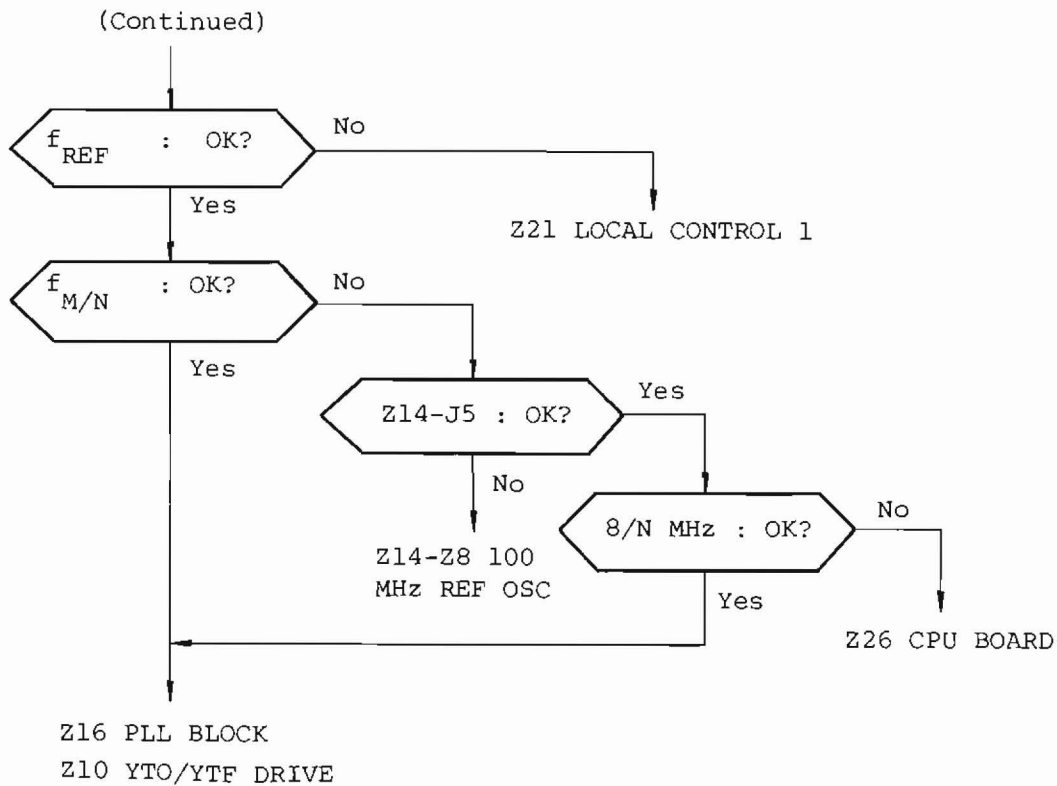


Fig. 4-3 (2/2) Troubleshooting Flowchart  
(When Local Signal System Is Faulty)

The best method of local signal system troubleshooting is to check each checkpoint frequency (Fig. 3-4) by setting zero span. The relationship between the center frequency and 1st local frequency is explained in paragraph 3.1. The relationships between 1st local frequency, M and N values, and  $f(M/N)$  values are listed in Table 4-1 shown below.

Table 4-1 (1/2) Relationship among N, M and F(M/N) for F(LO)  
(1st Local Frequency)

$$F(LO) = F_{ref} + 125N + 2M \quad (F_{ref}=18.4 \text{ MHz}) \quad F(M/N) = 1000 + 16\frac{M}{N}$$

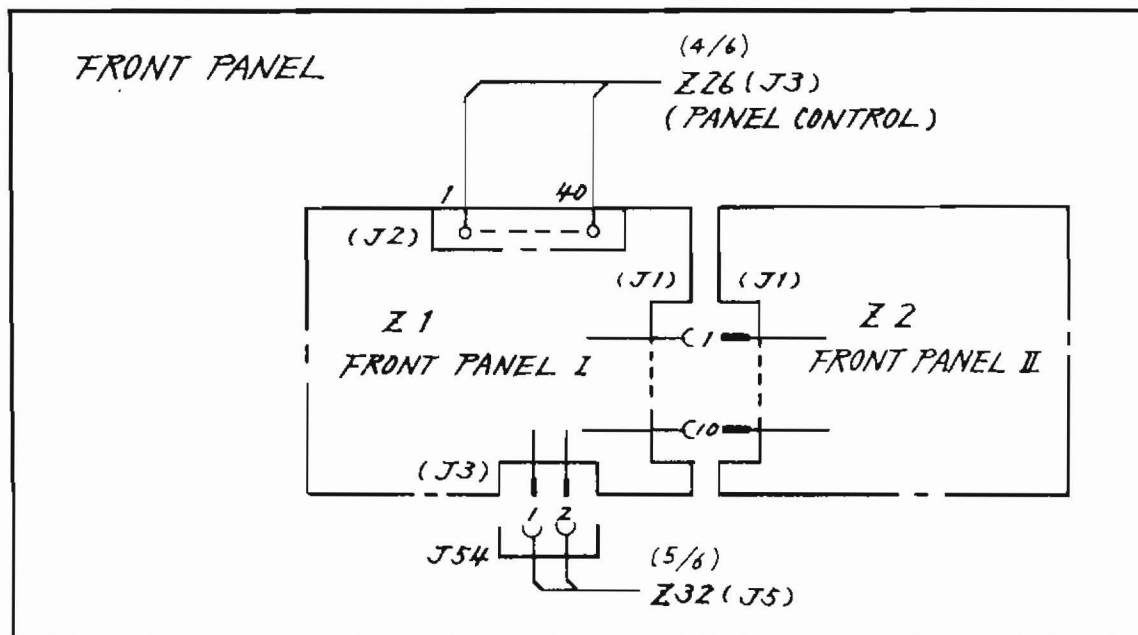
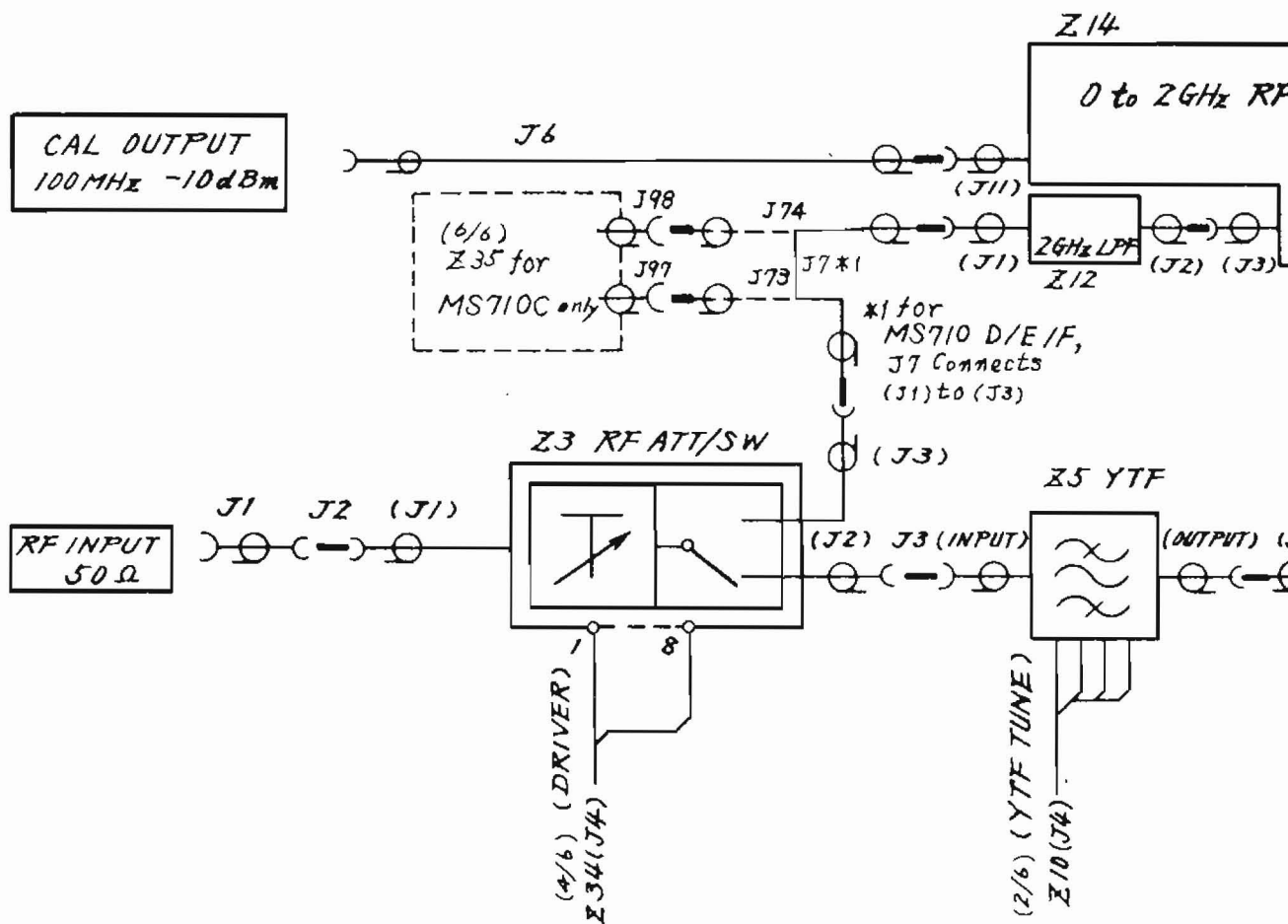
F(LO) MHz	N	M	F(M/N) MHz
2118.4	16	50	1050.00
2242.4	16	112	1112.00
2243.4	17	50	1047.06
2367.4	17	112	1105.41
2368.4	18	50	1044.44
2492.4	18	112	1099.56
2493.4	19	50	1042.11
2617.4	19	112	1094.32
2618.4	20	50	1040.00
2742.4	20	112	1089.60
2743.4	21	50	1038.10
2867.4	21	112	1085.33
2868.4	22	50	1036.36
2992.4	22	112	1081.45
2993.4	23	50	1034.78
3117.4	23	112	1077.91
3118.4	24	50	1033.33
3242.4	24	112	1074.67
3243.4	25	50	1032.00
3367.4	25	112	1071.68
3368.4	26	50	1030.77
3492.4	26	112	1068.92
3493.4	27	50	1029.63
3617.4	27	112	1066.37
3618.4	28	50	1028.57
3742.4	28	112	1064.00
3743.4	29	50	1027.59
3867.4	29	112	1061.79
3868.4	30	50	1026.67
3992.4	30	112	1059.73
3993.4	31	50	1025.81
4117.4	31	112	1057.81

Table 4-1 (2/2) Relationship among N, M and F(M/N) for F(LO)  
(1st Local Frequency)

$$[F(LO) = F_{ref} + 125N + 2M \quad (F_{ref}=18.4 \text{ MHz}) \quad F(M/N) = 1000 + 16\frac{M}{N}]$$

F (LO)	MHz	N	M	F (M/N)	MHz
4118.4		32	50	1025.00	
4242.4		32	112	1056.00	
4243.4		33	50	1024.24	
4367.4		33	112	1054.30	
4368.4		34	50	1023.53	
4492.4		34	112	1052.71	
4493.4		35	50	1022.86	
4617.4		35	112	1051.20	
4618.4		36	50	1022.22	
4742.4		36	112	1049.78	
4743.4		37	50	1021.62	
4867.4		37	112	1048.43	
4868.4		38	50	1021.05	
4992.4		38	112	1047.16	
4993.4		39	50	1020.51	
5117.4		39	112	1045.95	
5118.4		40	50	1020.00	
5242.4		40	112	1044.80	
5243.4		41	50	1019.51	
5367.4		41	112	1043.71	
5368.4		42	50	1019.05	
5492.4		42	112	1042.67	
5493.4		43	50	1018.60	
5617.4		43	112	1041.67	
5618.4		44	50	1018.18	
5742.4		44	112	1040.73	
5743.4		45	50	1017.78	
5867.4		45	112	1039.82	
5868.4		46	50	1017.39	
5992.4		46	112	1038.96	





14

0 to 2 GHz RF BLOCK (1/2)

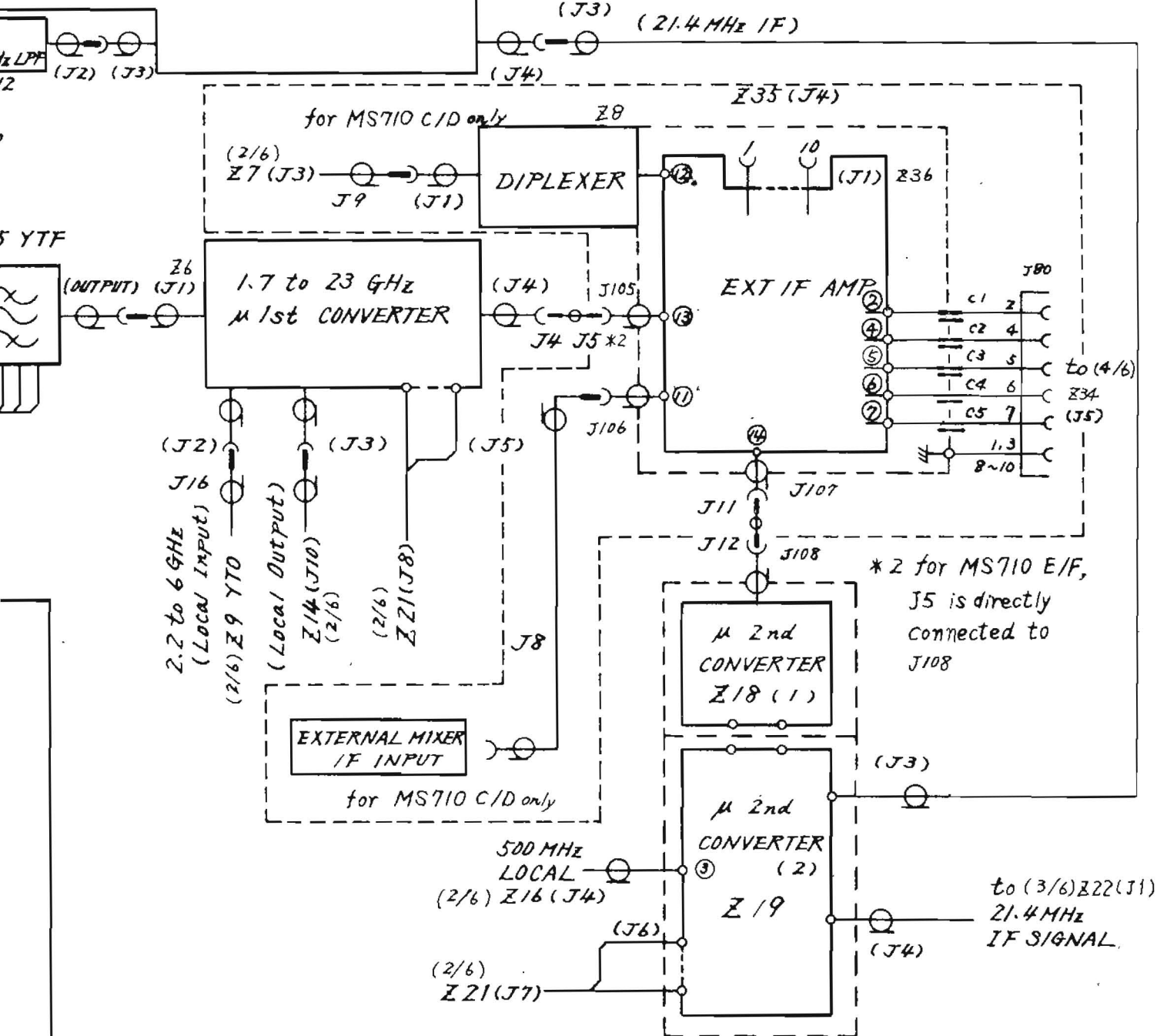


Fig. 4-4 (1/6)

MS710[ ] Circuit Diagram (1/6)  
(43W34994)

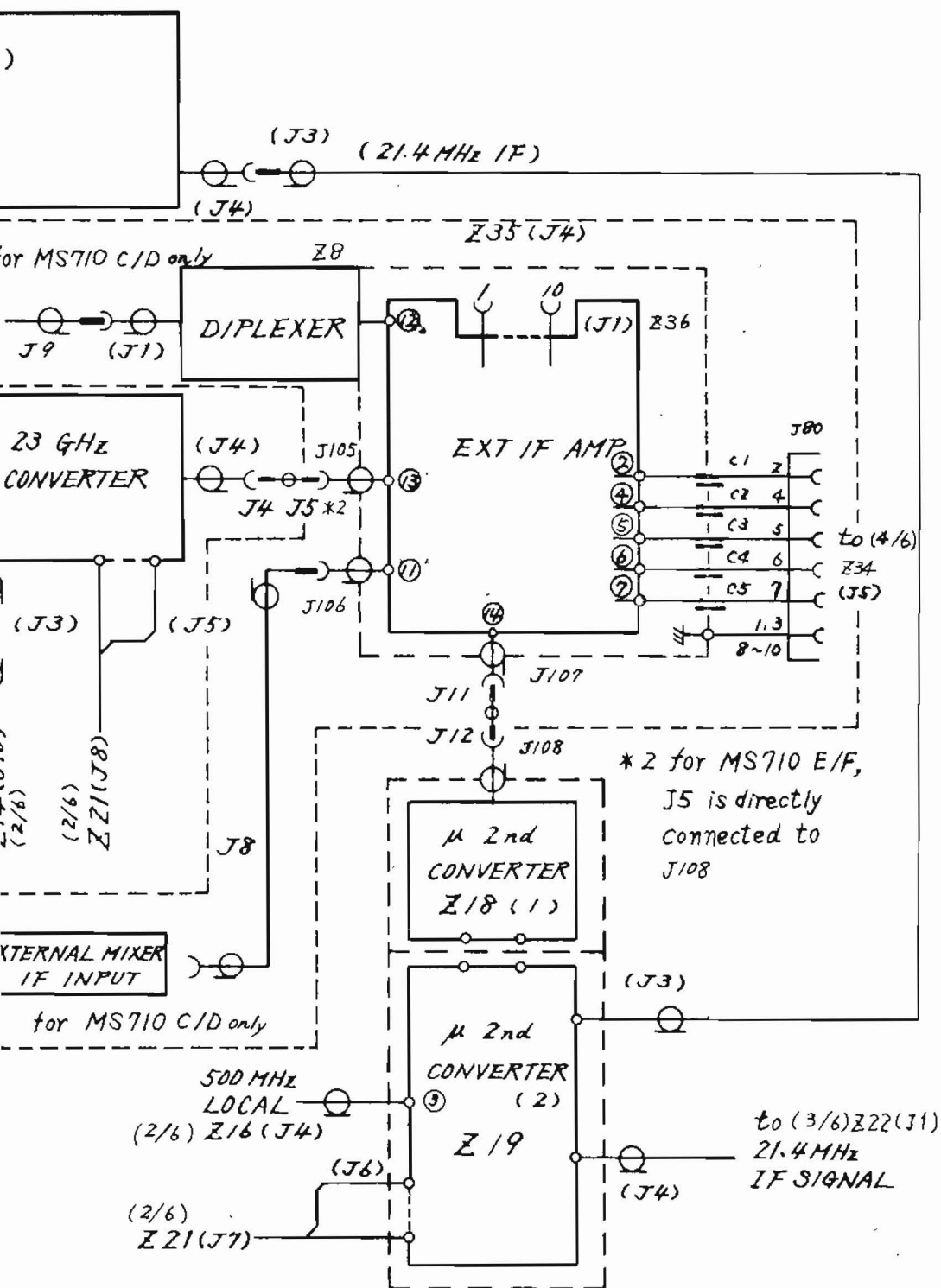
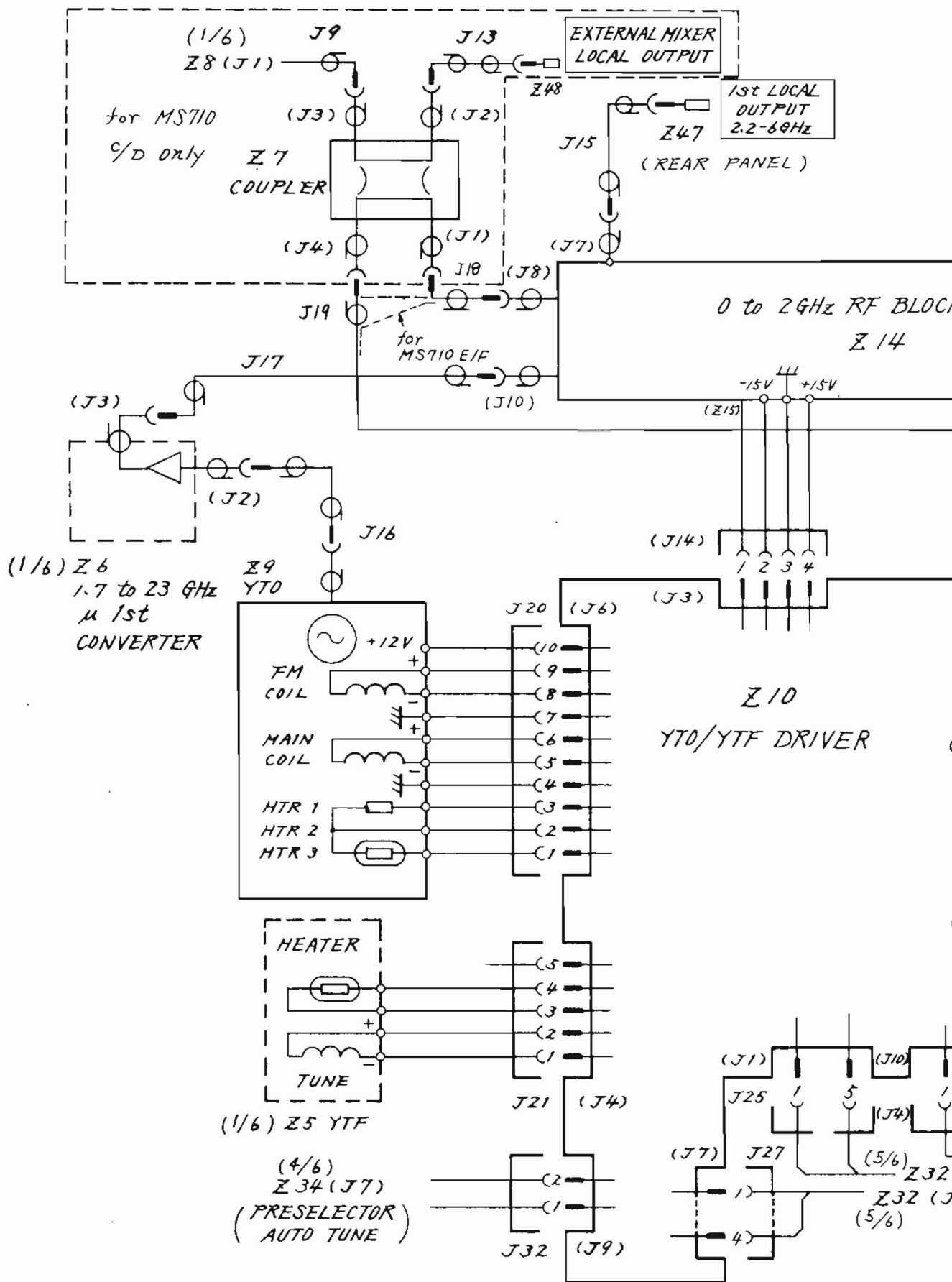
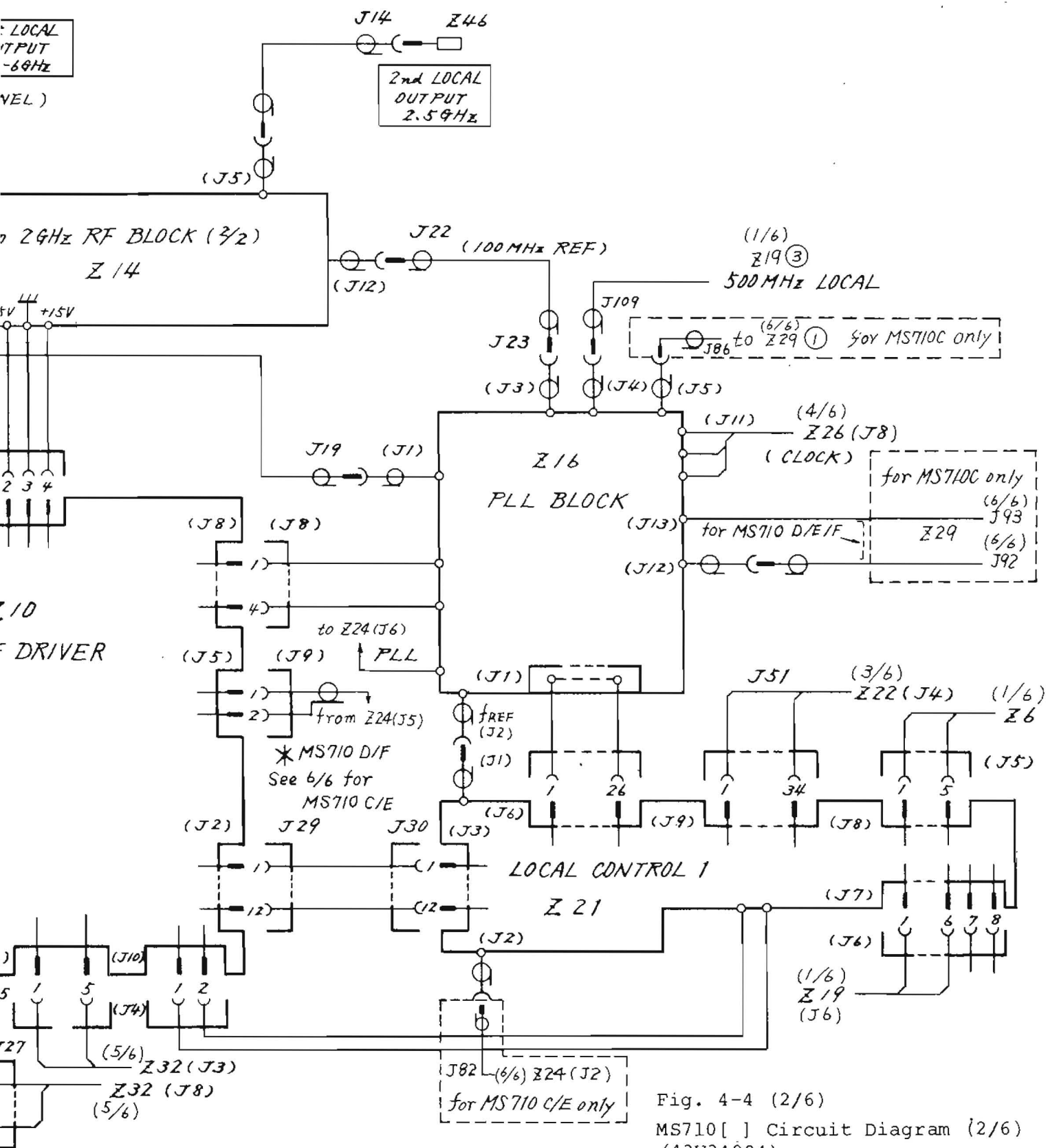


Fig. 4-4 (1/6)  
MS710[ ] Circuit Diagram (1/6)  
(43W34994)





Z46

LOCAL  
UT  
MHz

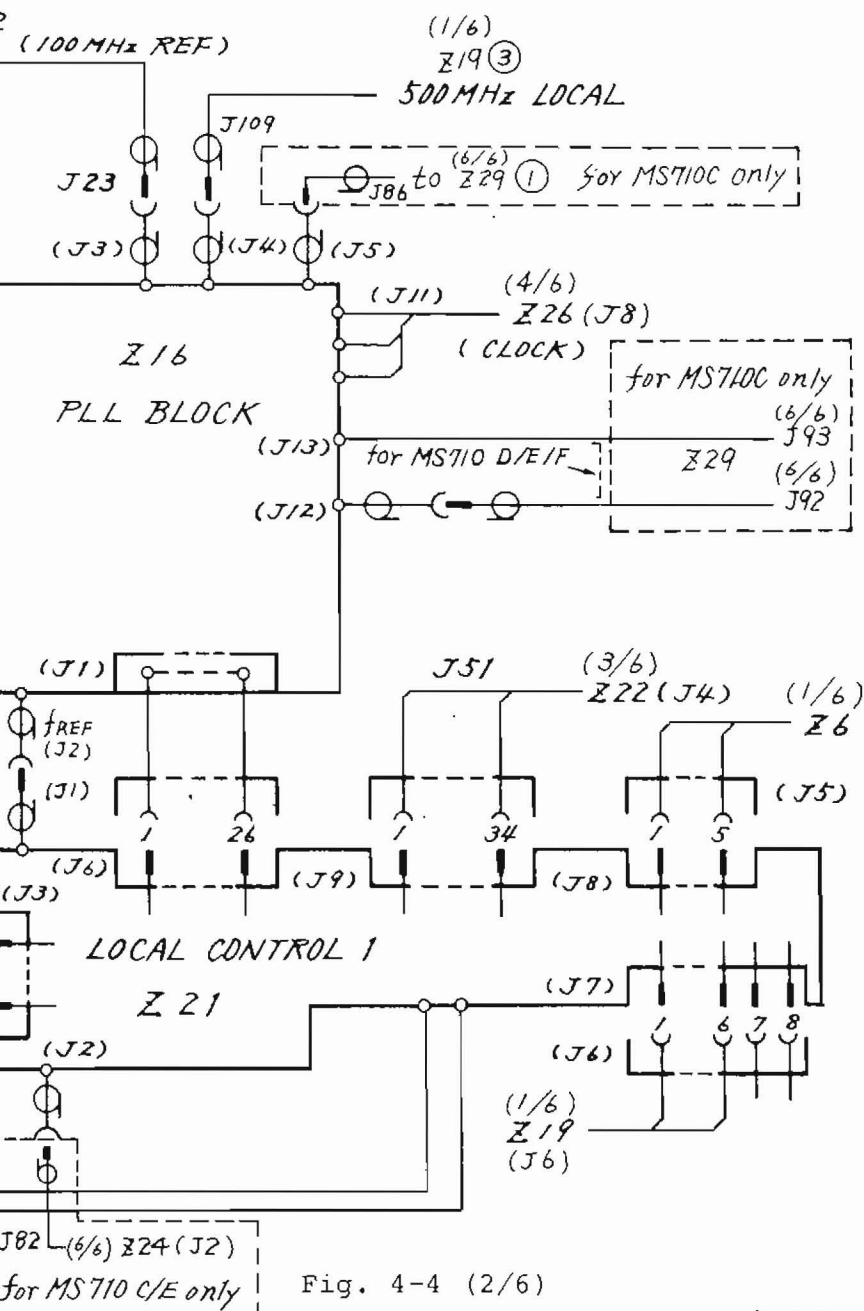


Fig. 4-4 (2/6)  
MS710[ ] Circuit Diagram (2/6)  
(43W34994)

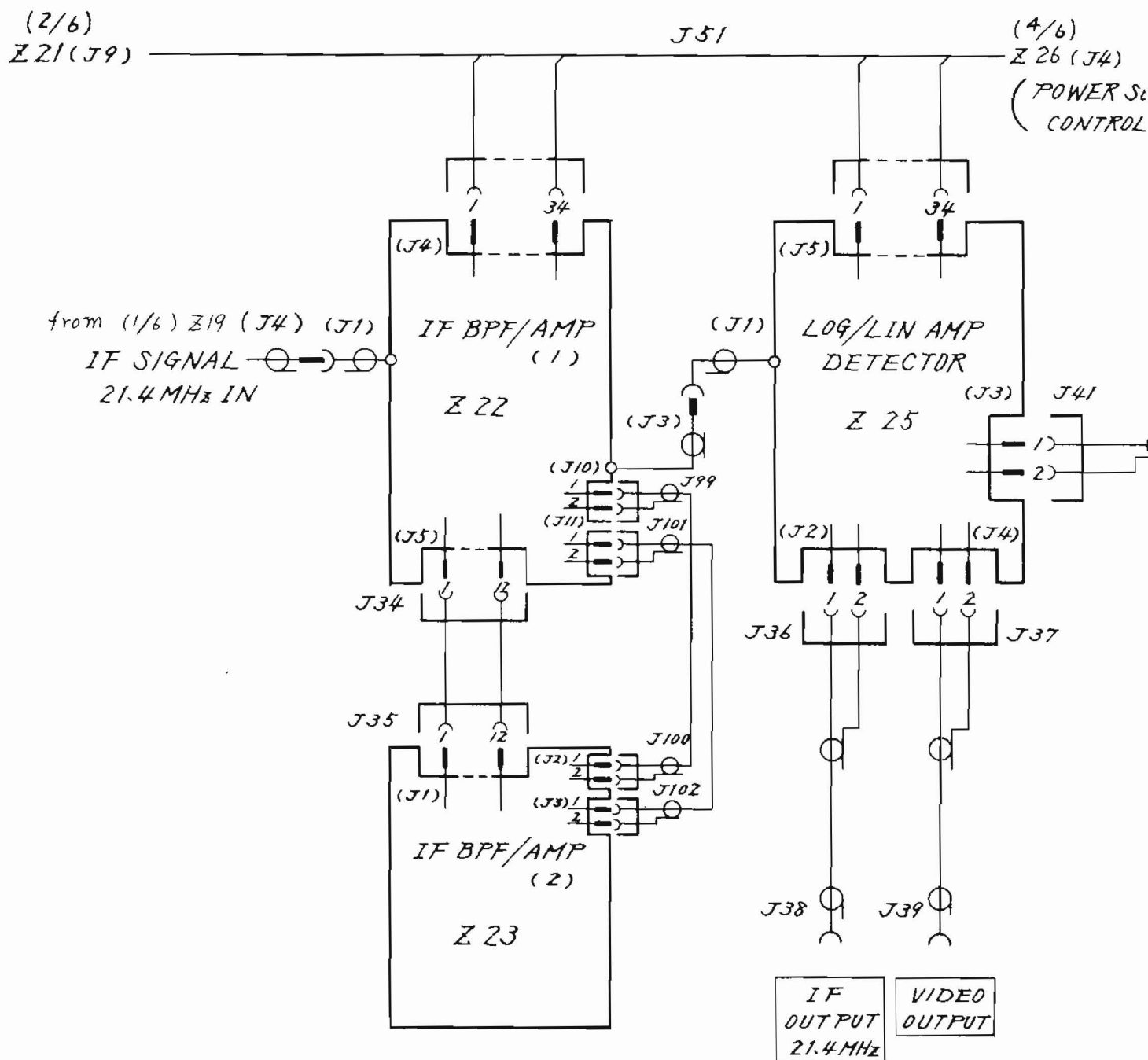


Fig  
MS7  
(43)

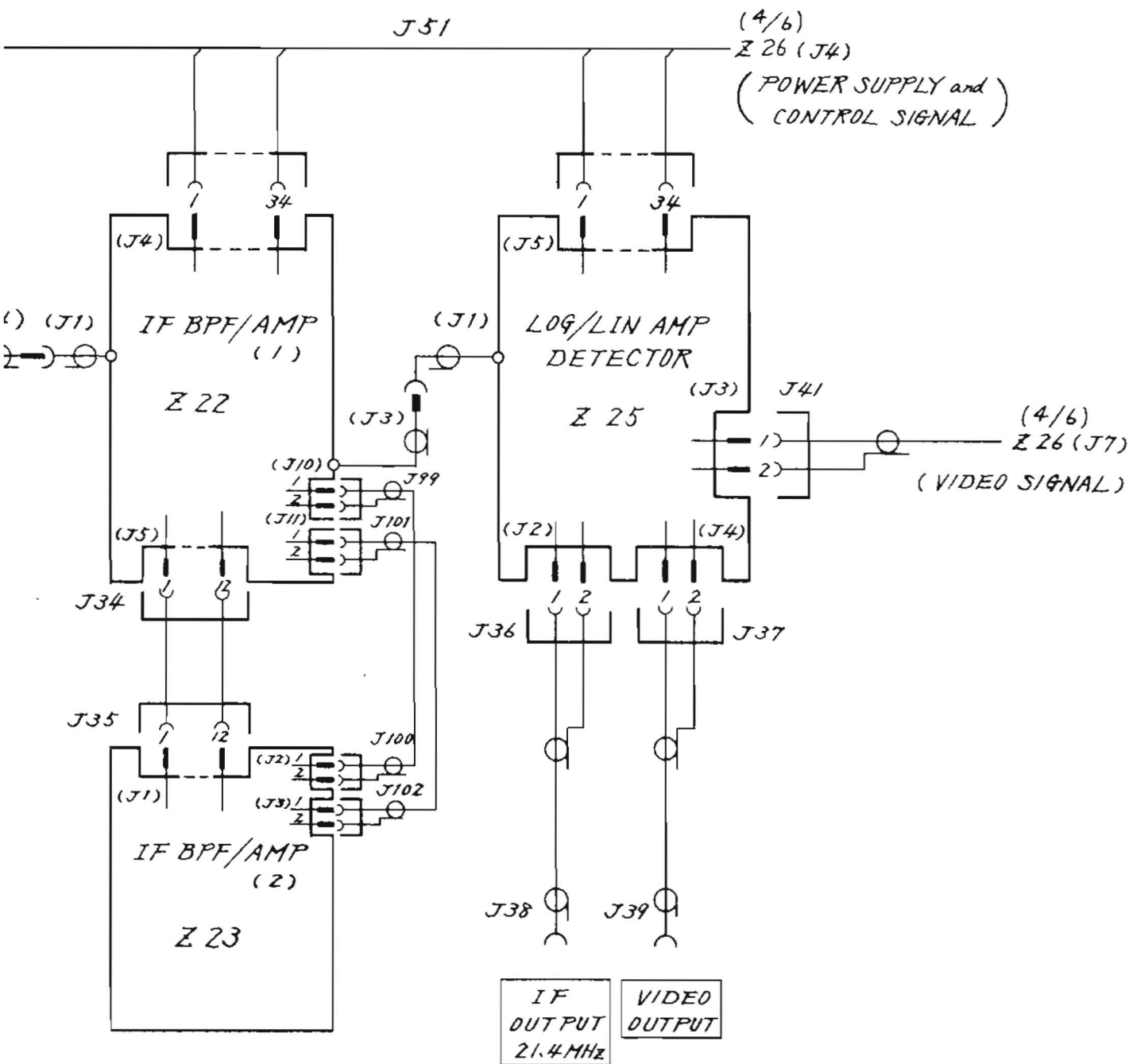
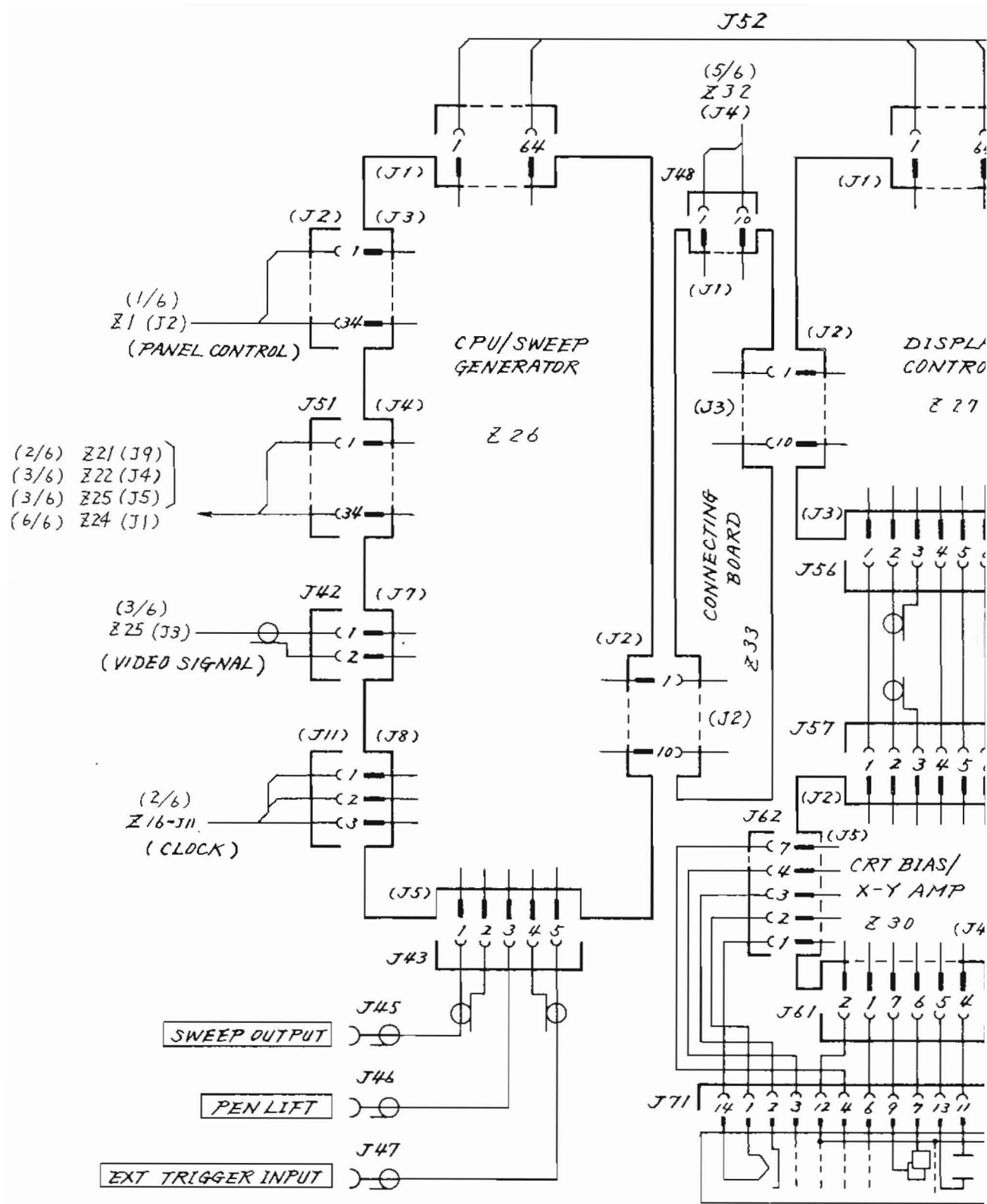


Fig. 4-4 (3/6)

MS710[ ] Circuit Diagram (3/6)  
(43W34994)





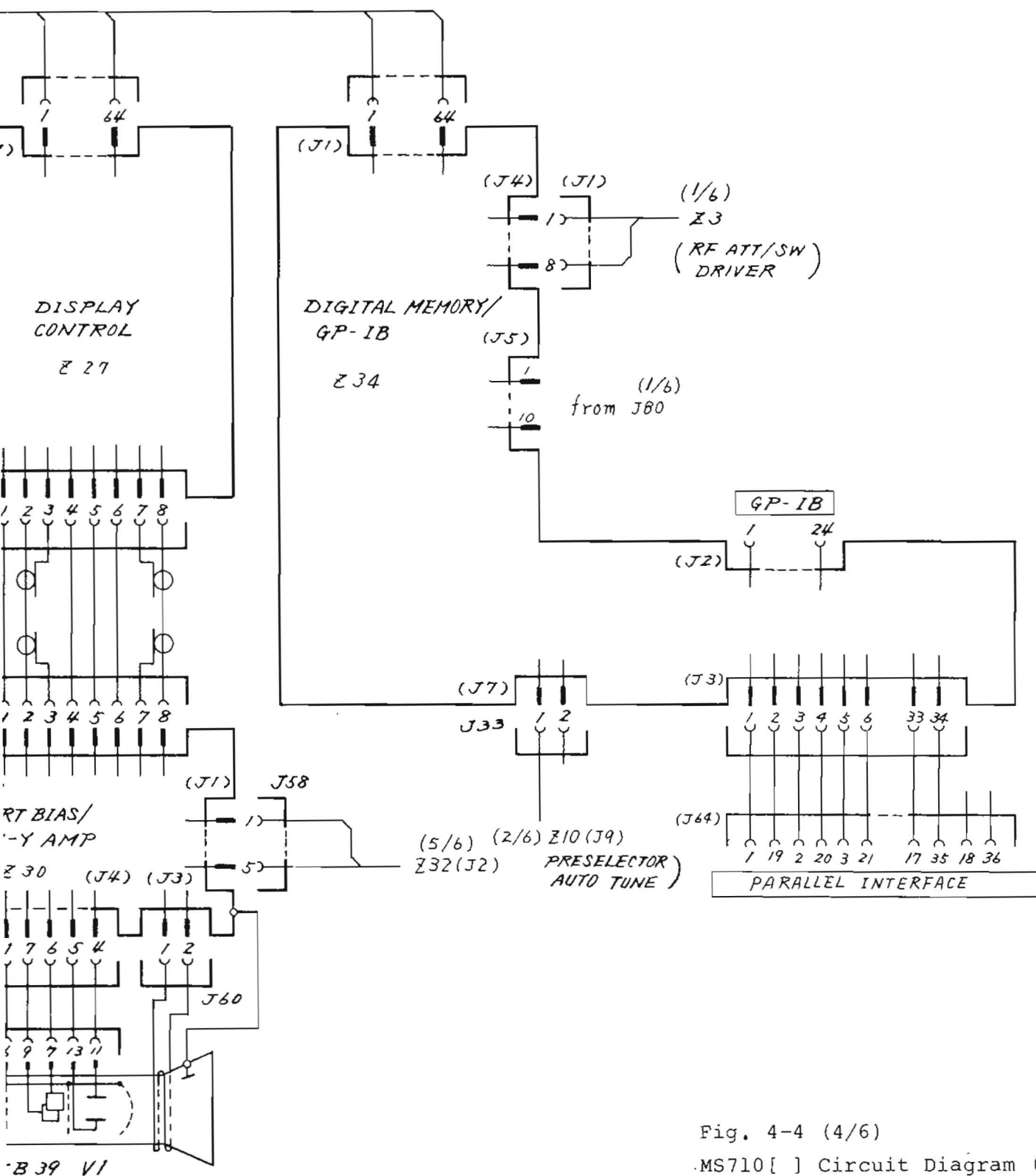
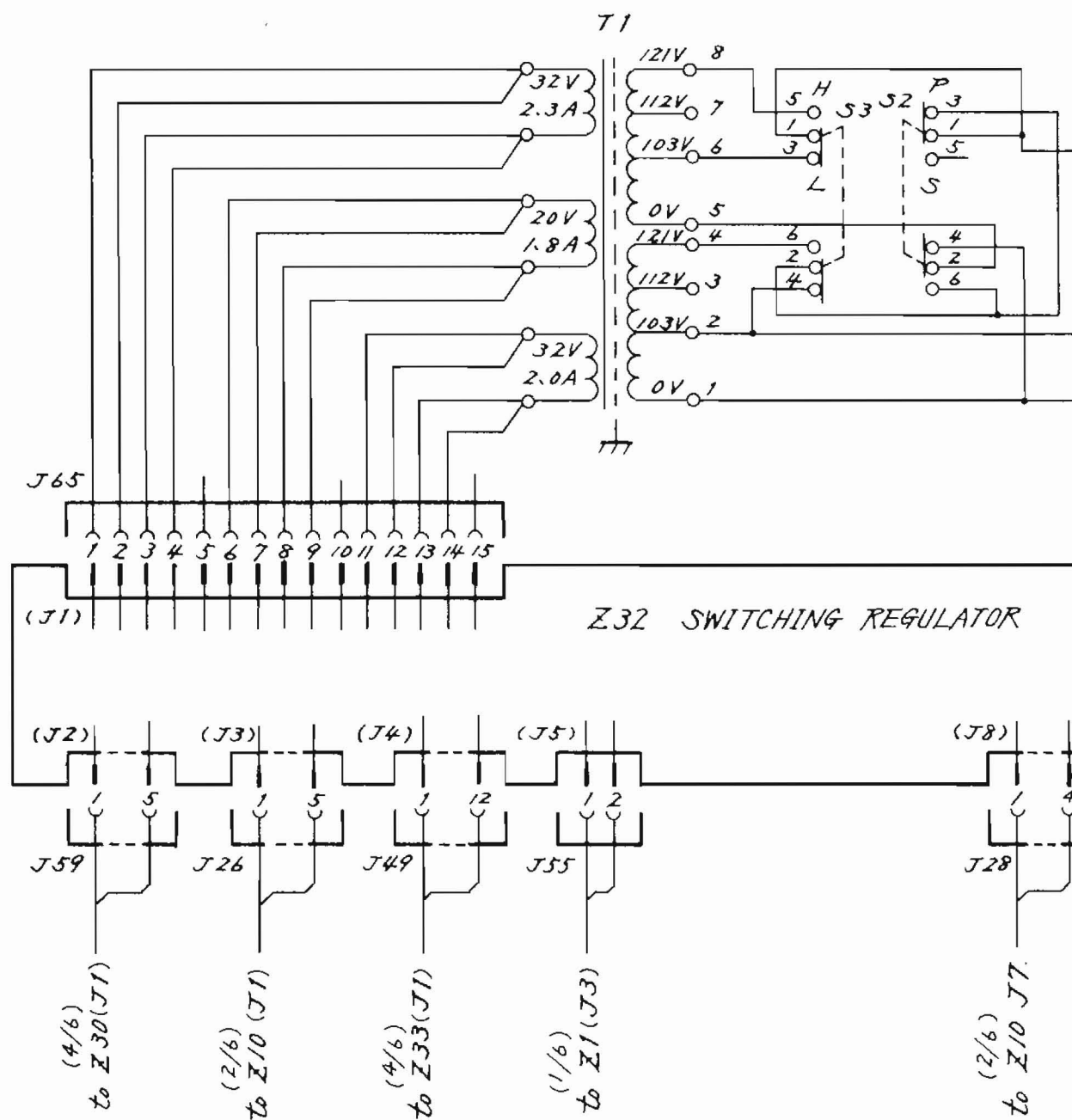
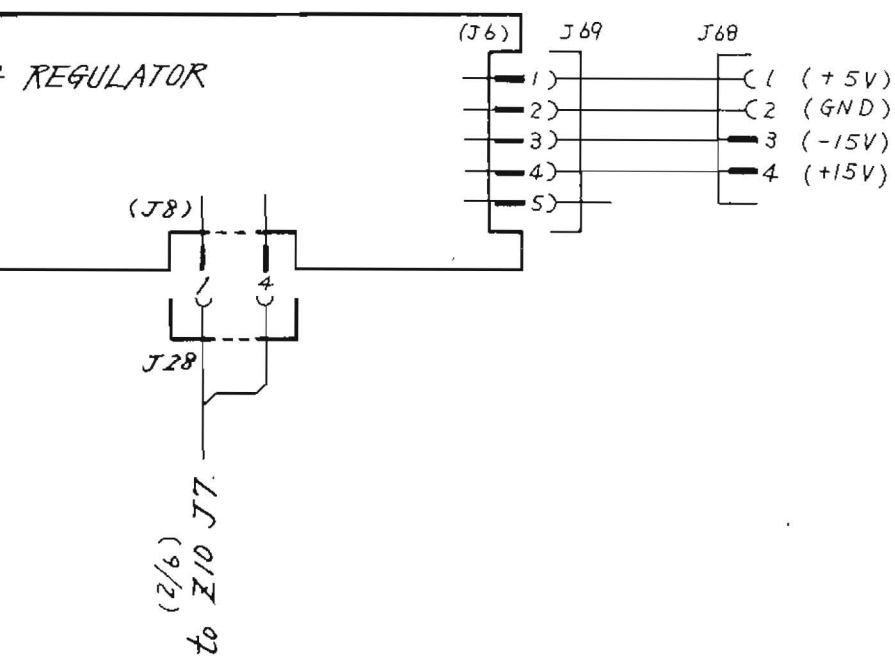
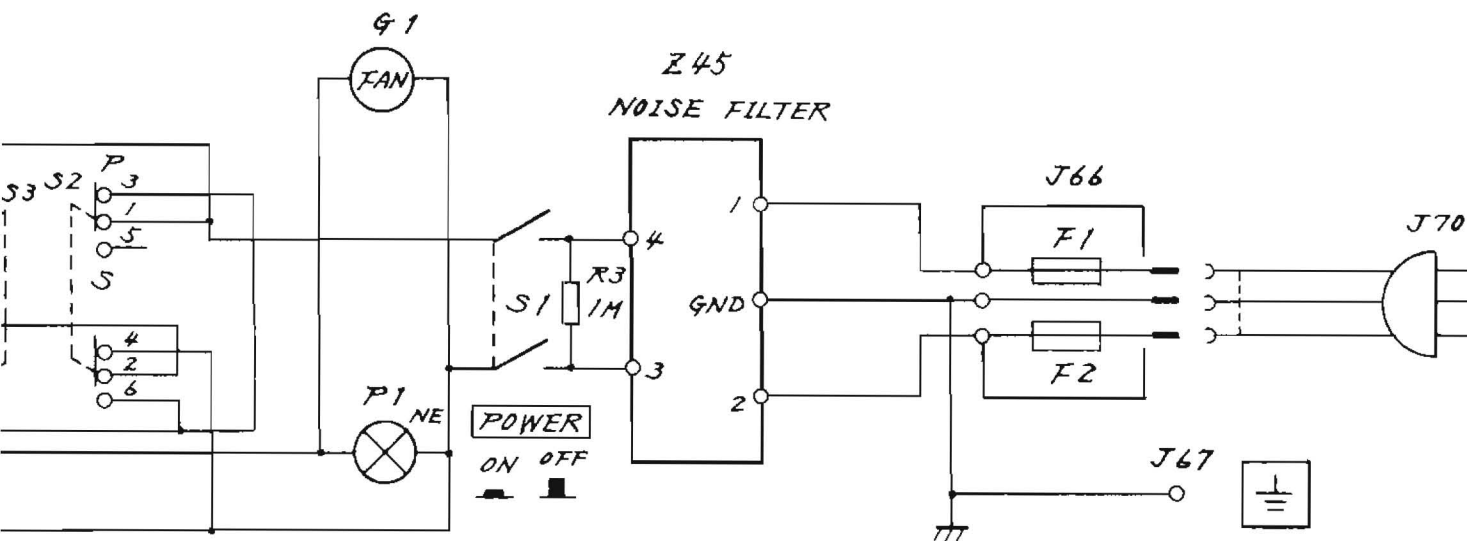


Fig. 4-4 (4/6)

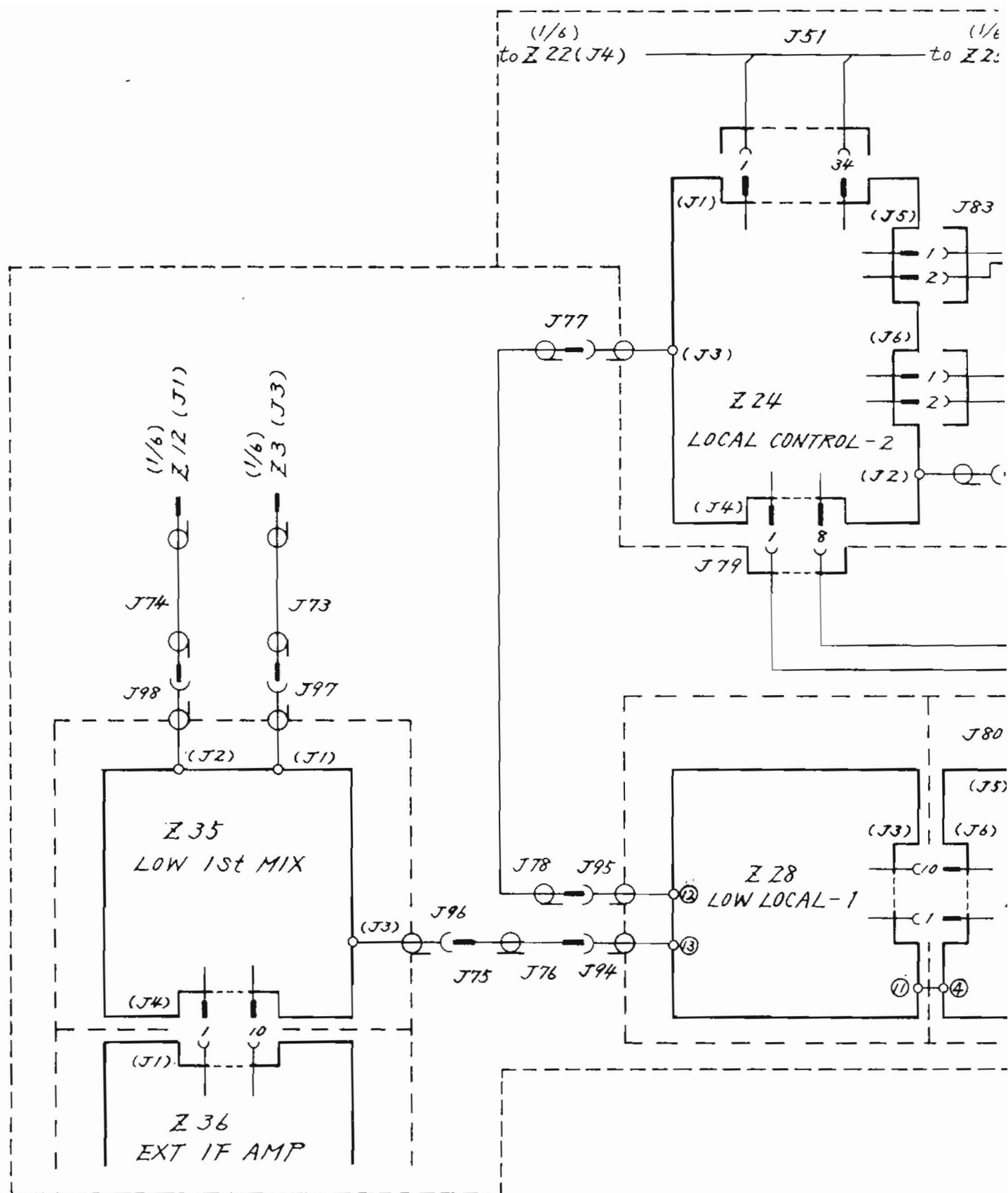
MS710[ ] Circuit Diagram (4/6)  
(43W34994)





PROBE  
POWER

Fig. 4-4 (5/6)  
MS710[ ] Circuit Diagram (5/6)  
(43W34994)



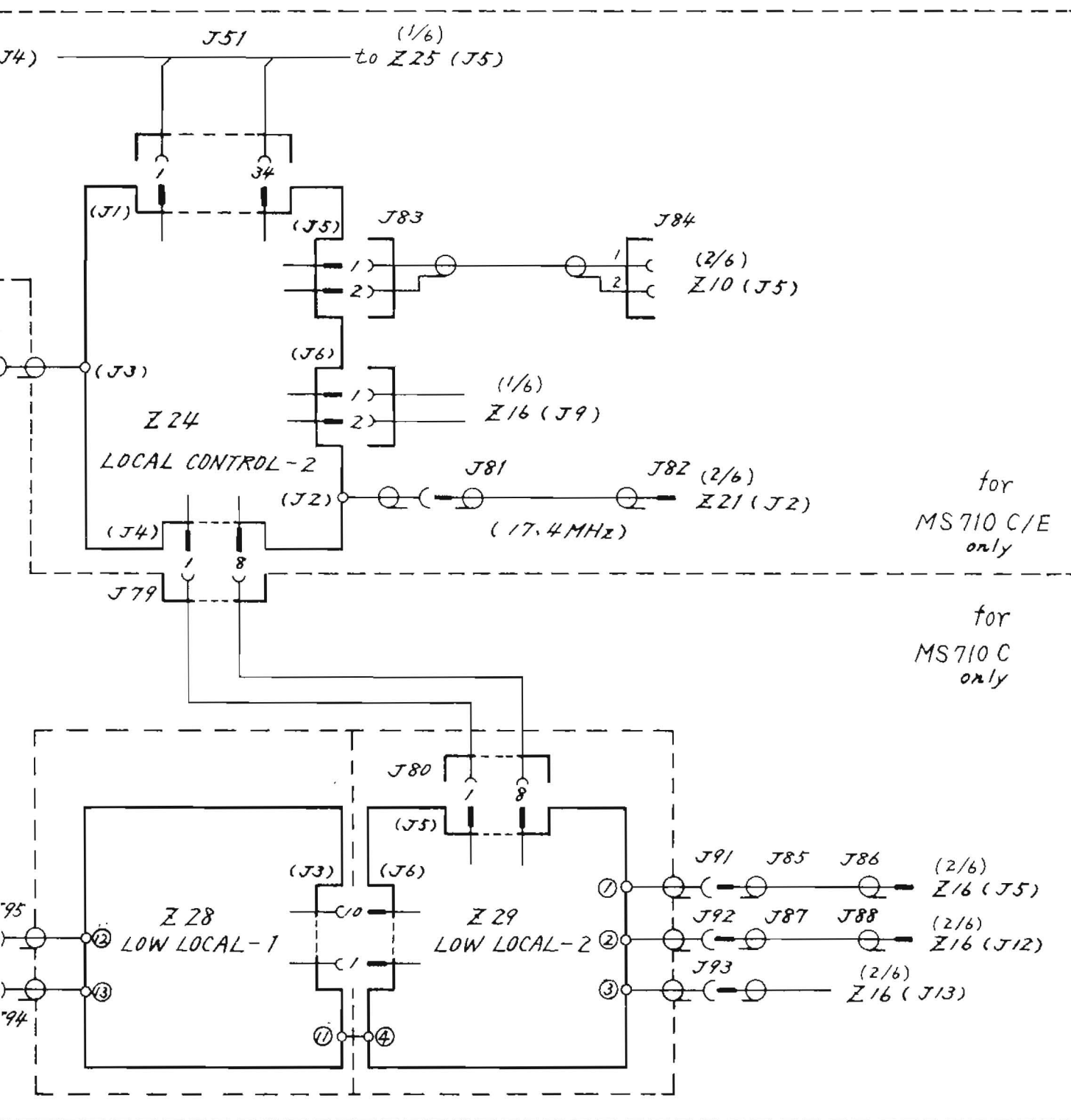


Fig. 4-4 (6/6)

MS710[ ] Circuit Diagram (6/6)  
(43W34994)

## SECTION 5

### EACH PC BOARD TROUBLESHOOTING, REPAIR, AND ADJUSTMENT

#### 5.1 General

##### 5.1.1 Configuration

In this section, blocks are classified according to their printed circuit boards or corresponding units in the order of Z numbers. The following three points are explained.

1. Circuit and operation of each block
2. Checkpoints to be analyzed and signal levels and waveforms at these points
3. Adjustment locations and methods of adjustment

The explanation of each block includes the related diagram and parts layout.

##### 5.1.2 Required equipment

When removing internal blocks and PC boards from the mainframe and checking them, note that the extension cable and extender board are different from those used in the inter-mainframe package.

The extender board, extender cable, and various adapters for troubleshooting are provided in service kits and are optionally available.

In addition, Table 5-1 lists the measuring equipment required for troubleshooting, repair and adjustment.

Table 5-1 Equipment for Troubleshooting, Repair, and Adjustment

EQUIPMENT	REQUIRED PERFORMANCE	MODEL (Anritsu)	APPLICATION
Power Meter & Sensor	Range: -20 to +20 dBm	ML69A	5.4, 5.6,
	Frequency range: 10 kHz to 1000 MHz	ML83A	5.7, 5.9
	Frequency range: 10 MHz to 18 GHz	(Indicator) MA72B	
	Frequency range: 18 to 23 GHz	(Sensor)	
Frequency Counter	Frequency range: 10 kHz to 18 GHz	MF76A	5.4, 5.5, 5.6, 5.7,
	Frequency range: 18 to 23 GHz		5.9, 5.13 5.11, 5.16
Signal Generator	Frequency range: 100 kHz to 1300 MHz	MG655A	5.4, 5.5, 5.11, 5.16
	Frequency range: 1 to 23 GHz	MG724[ ]	5.8, 5.10 5.21, 5.22 5.12
Spectrum Analyzer	Frequency range: 10 MHz to 1 GHz	MS610A	5.4, 5.6, 5.15, 5.7, 5.10, 5.21, 5.22
Oscilloscope (High-voltage probe)	Frequency range: 200 MHz, 5 mV		5.3, 5.5, 5.7, 5.9,
	High-voltage probe: 10 kV		5.13, 5.14, 5.17, 5.20, 5.18, 5.11
Digital Volt Meter	5 digits, Minimum digit: 1 mV		5.9, 5.12, 5.18
Spectrum/ Network Analyzer	Frequency range: 30 Hz to 30 MHz	MS420B	5.10, 5.16
Resistance Attenuator	Frequency range: DC to 500 MHz Attenuation: 0 to 90 dB Impedance: 50 $\Omega$	MN510C	5.12



## 5.2 Basic Troubleshooting and Postprocessing

Refer to Section 3 to fully understand the entire signal flow, which is prerequisite to efficient troubleshooting.

General troubleshooting involves the checking of I/O signal frequency, waveforms, and the levels of each part or voltage.

If an abnormality is detected, check the previous checkpoint and isolate the part at which abnormal operation was detected. It is assumed, of course, that the correct power is being supplied to the part(s) in question. If the setting conditions of the MS710[ ] functions are not explicitly specified in the description, assume that the automatic setting status after power on is in effect.

After an abnormality or defective part is located and has been repaired, check whether or not any adjustment is required, as explained in this section. If necessary, make the correct adjustment(s).

Refer to the explanations given in the section 8 of the Operation Manual for the performance check to be made following the adjustment(s).

### 5.3 Z1 Front Panel I and Z2 Front Panel II

#### 5.3.1 Circuit description - Z1 and Z2

(Refer to Fig. 3-3 (3/4), Fig. 5-3)

All switches, variable resistors, and LEDs used for front-panel status indications are mounted on the above two PC boards.

All push-button switches are connected in a matrix format. Status is read by the keyboard display controller (Z26-Q38).

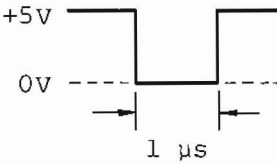
This controller is mounted on the Z26 CPU/Sweep Generator PC Board and is connected by scanning lines SL0 to RL7, which are distributed through the Q11 decoder. All LEDs except the sweep LED are dynamically driven under control of the same keyboard display controller (Z26-Q38). Q10 is the anode-side scanning line decoder and Q12 and Q13 are drivers. Q14 is the cathode-side driver.

The rotary encoder consists of Z1-Z2, Q3, and Q4 and is used for setting and changing continuous data. This output pulse is sent to the Z26 CPU/Sweep Generator PC Board through the direction-of-rotation decision circuit consisting of Q5, Q6, and Q7, and, the waveform-shaping circuit. Whenever the rotary encoder is moved by one click, a CPU interrupt occurs. When this interrupt is accepted, the CPU reads the UP/DOWN directions and performs the required processing.

The amplitudes and destinations of the analog control signals generated by the five variable resistors are shown in Table 5-1 in Fig. 5-3.

Z1-Z1 is the electronic buzzer that sounds an alarm.

### 5.3.2 Checking procedure - Z1 and Z2

Step	Procedure
1.	See Fig. 2-2; remove the front panel.
2.	Use an oscilloscope to confirm that the voltages of checkpoint ① to ⑨, shown in Figs. 5-2 and 5-3, satisfy the values listed in Table 5-1 and are indicated in the figures.
3.	While turning the rotary encoder (data knob), observe the waveforms at checkpoint ⑩ on the oscilloscope and confirm that the pulse-shaped signals are being generated as below.
	
4.	When turning the rotary encoder clockwise, confirm that the checkpoing level ⑪ is set to the low level (0 V). When turning it counterclockwise, confirm that the checkpoint level at ⑪ is set to the high level (5 V).
5.	If an abnormality occurs during the check explained in procedure 3 or 4, recheck the abnormality by adjusting R2 ⑫.
6.	If the signal waveforms at checkpoint ⑬ SL0 to SL2 and checkpoint ⑭ OUTB0 to OUTA1 appear as shown in Fig. 5-1, they are normal.

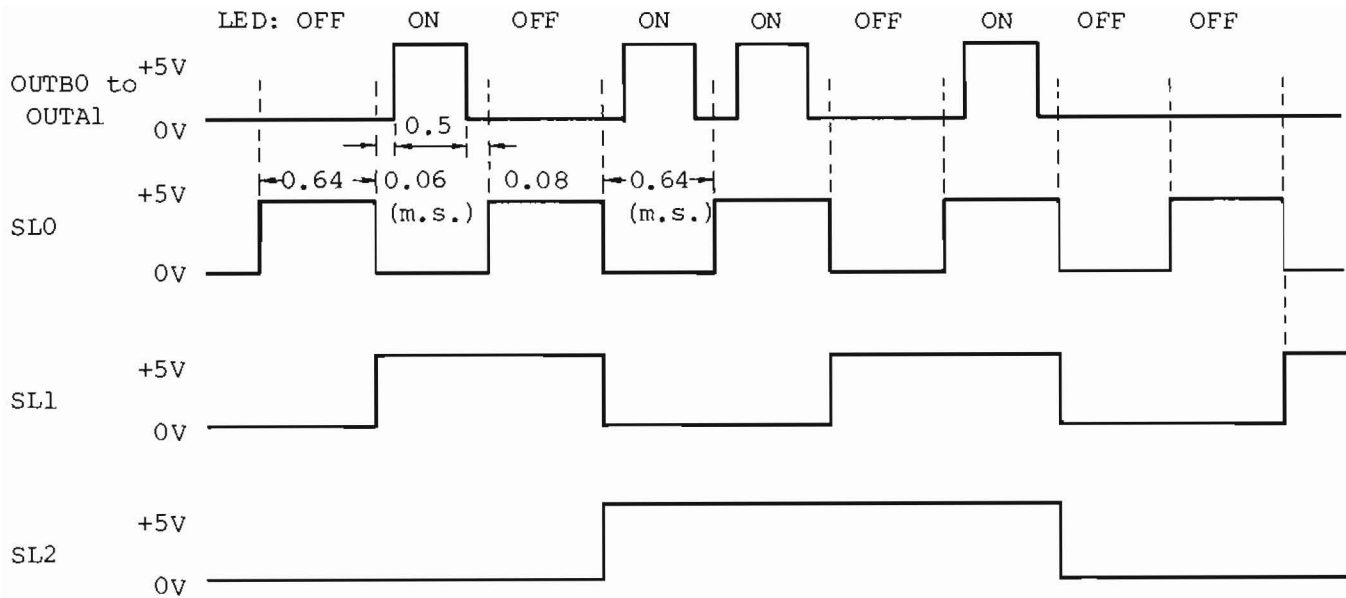


Fig. 5-1 Display Scan Timing (Z1 FRONT PANEL I)

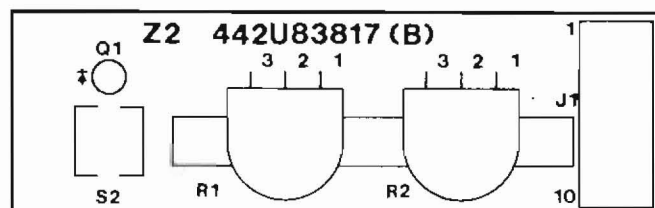
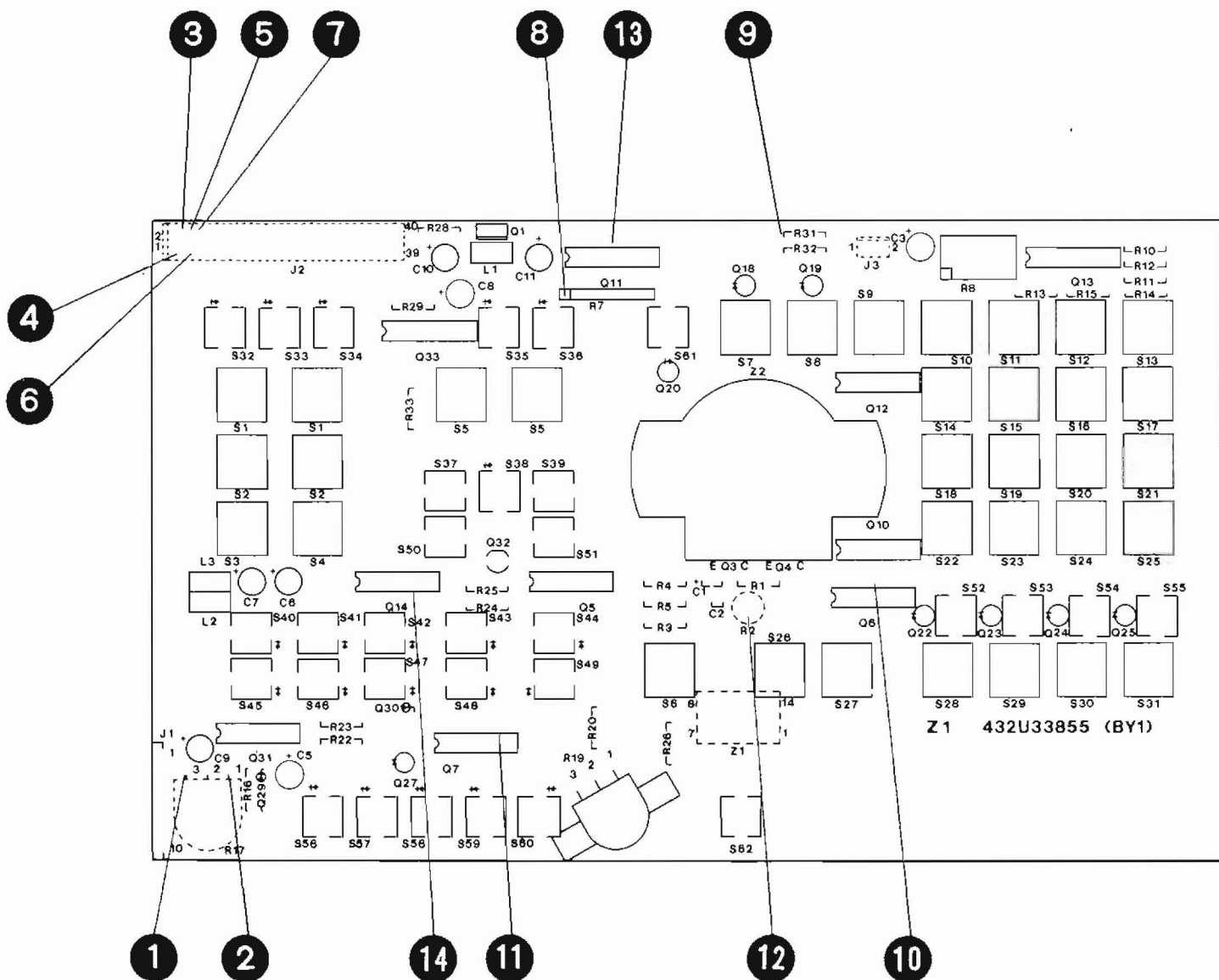
Note 1: The waveform at OUTB0 to OUTA1 depends on the status indicated by the LED. This figure shows an example.

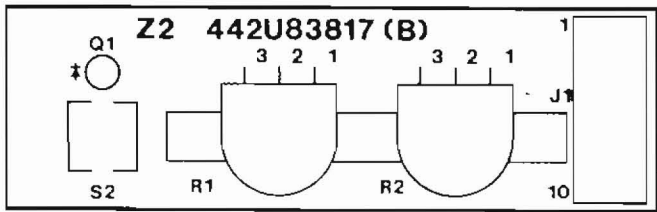
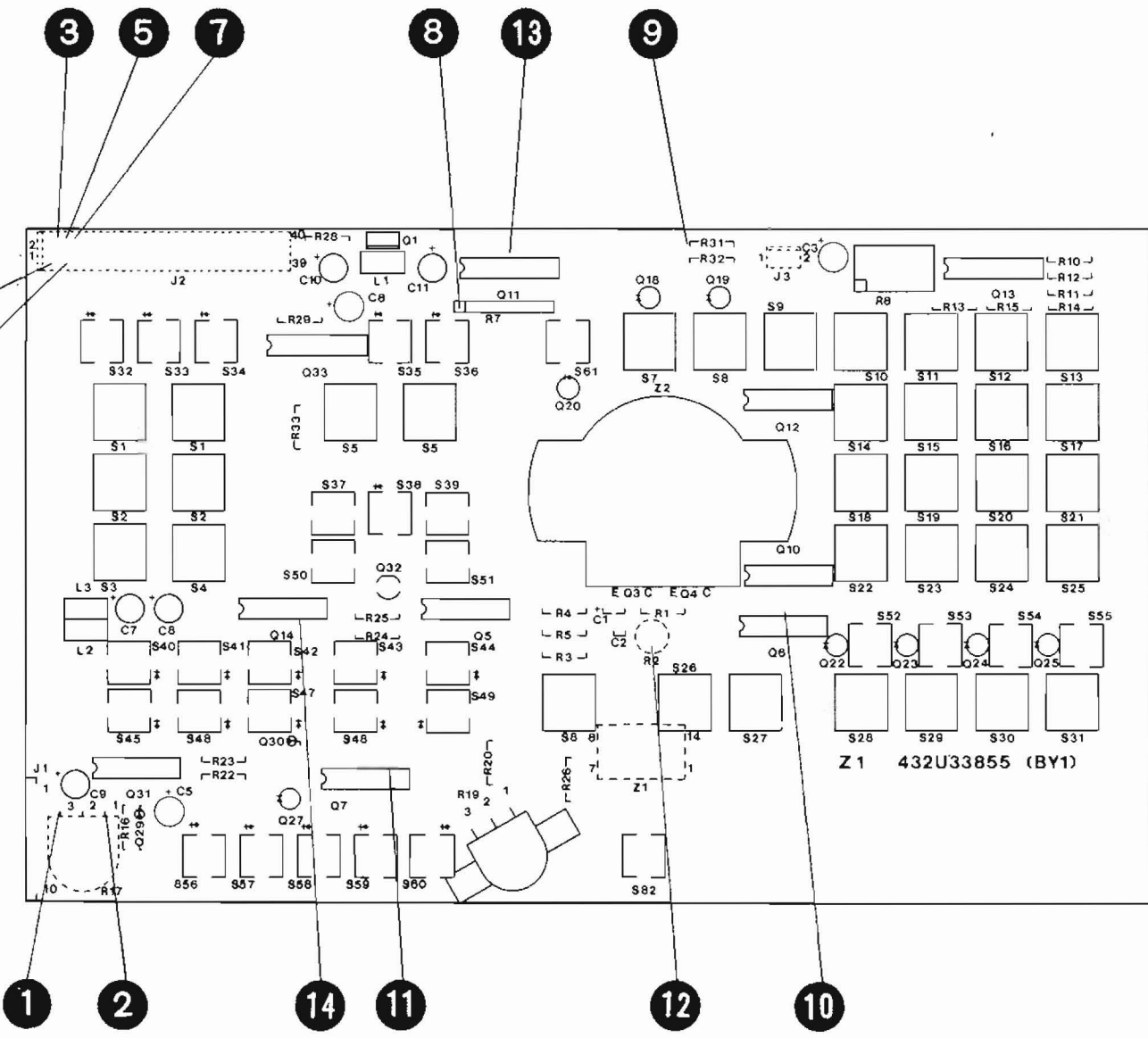
Note 2: The unit of time is milliseconds (ms).

### 5.3.3 Adjustment - Z1 and Z2

Z1-R2 adjusts the brightness of the built-in rotary encoder LED to accurately indicate clockwise and counterclockwise rotations.

Step	Procedure
1.	Press the center frequency switch.
2.	Adjust R2 so that the frequency display on the CRT can be increased when turning the encoder clockwise, and decreased when turning it counterclockwise. (Set R2 to the center of the normal operation range by turning the R2 adjustment screw at both ends.)





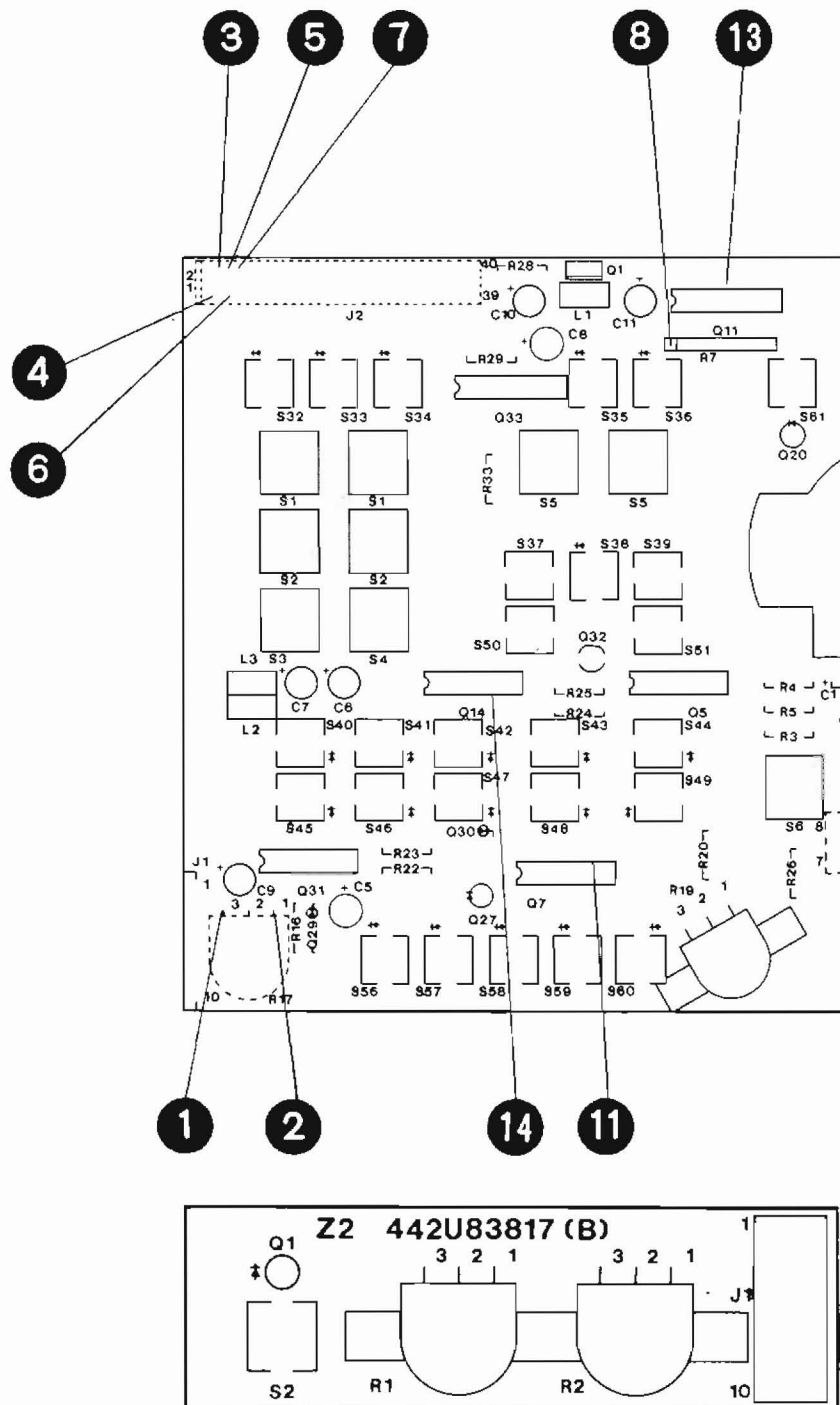


Fig. 5-2 Z1 and Z2  
Parts Layout

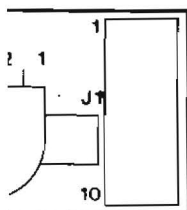




Table 5-2  
Nominal Output Voltage of  
Variable Resistor Controls (V)

Control	Test Point	MIN	MAX
INTENSITY (R1/Z2)	3	-VR	+VR
FREQ CAL (R16/Z1)	4	-VR	0
LEVEL CAL (R17/Z1)	5	-VR	+VR
PRESELECTOR PEAK (R12/Z1)	6	-VR	+VR
TRIGGER LEVEL (R18/Z1)	7	+0.2	+VR

1 2 VR = 3.6 to 4.0 V

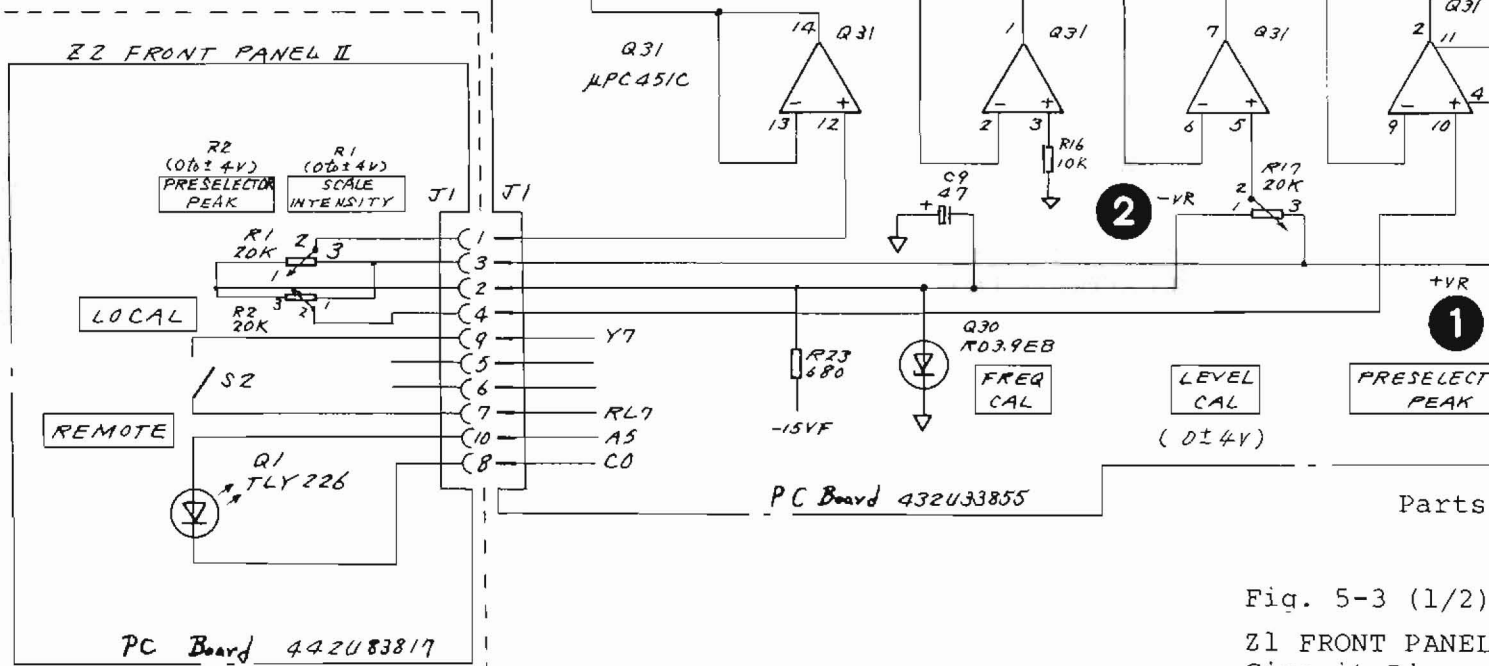
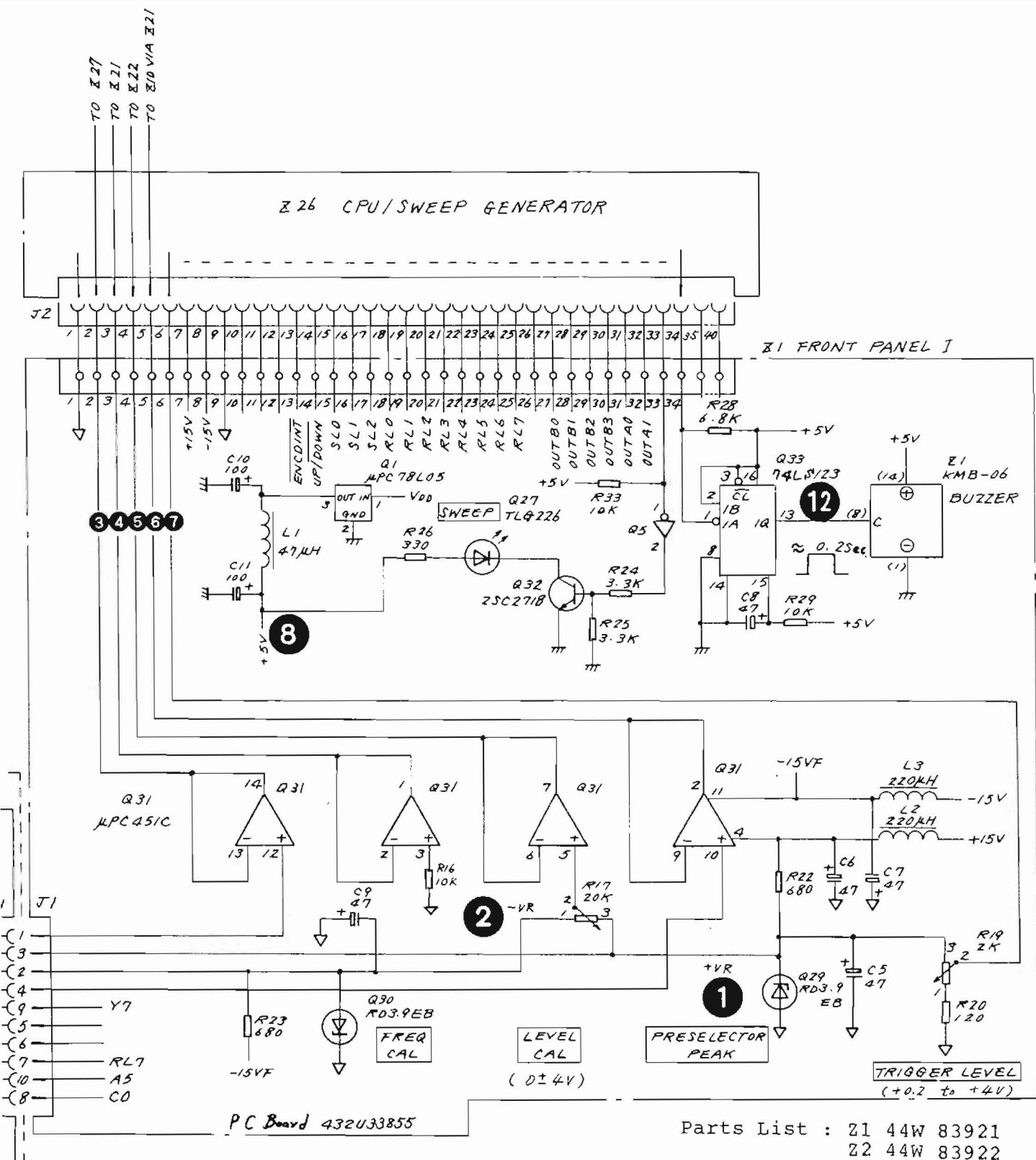
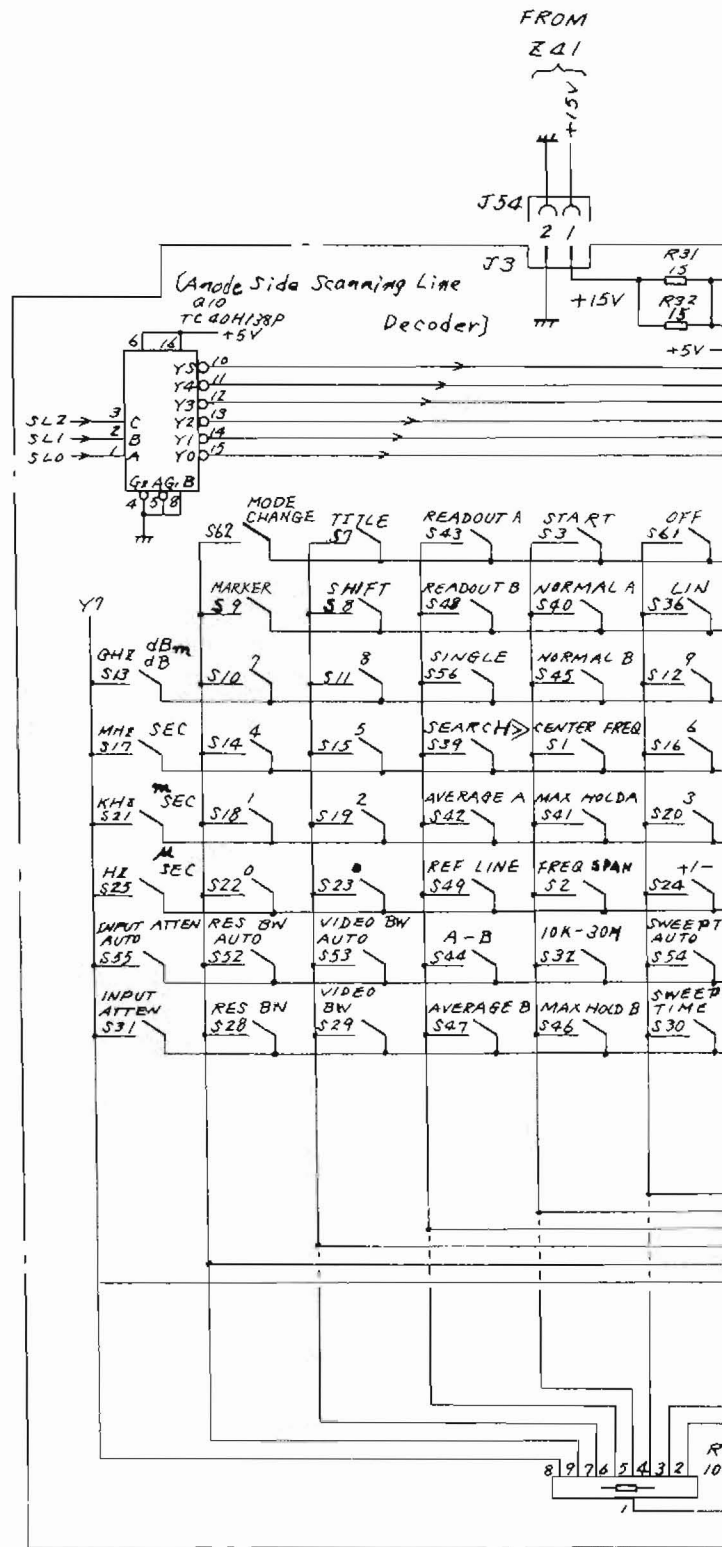
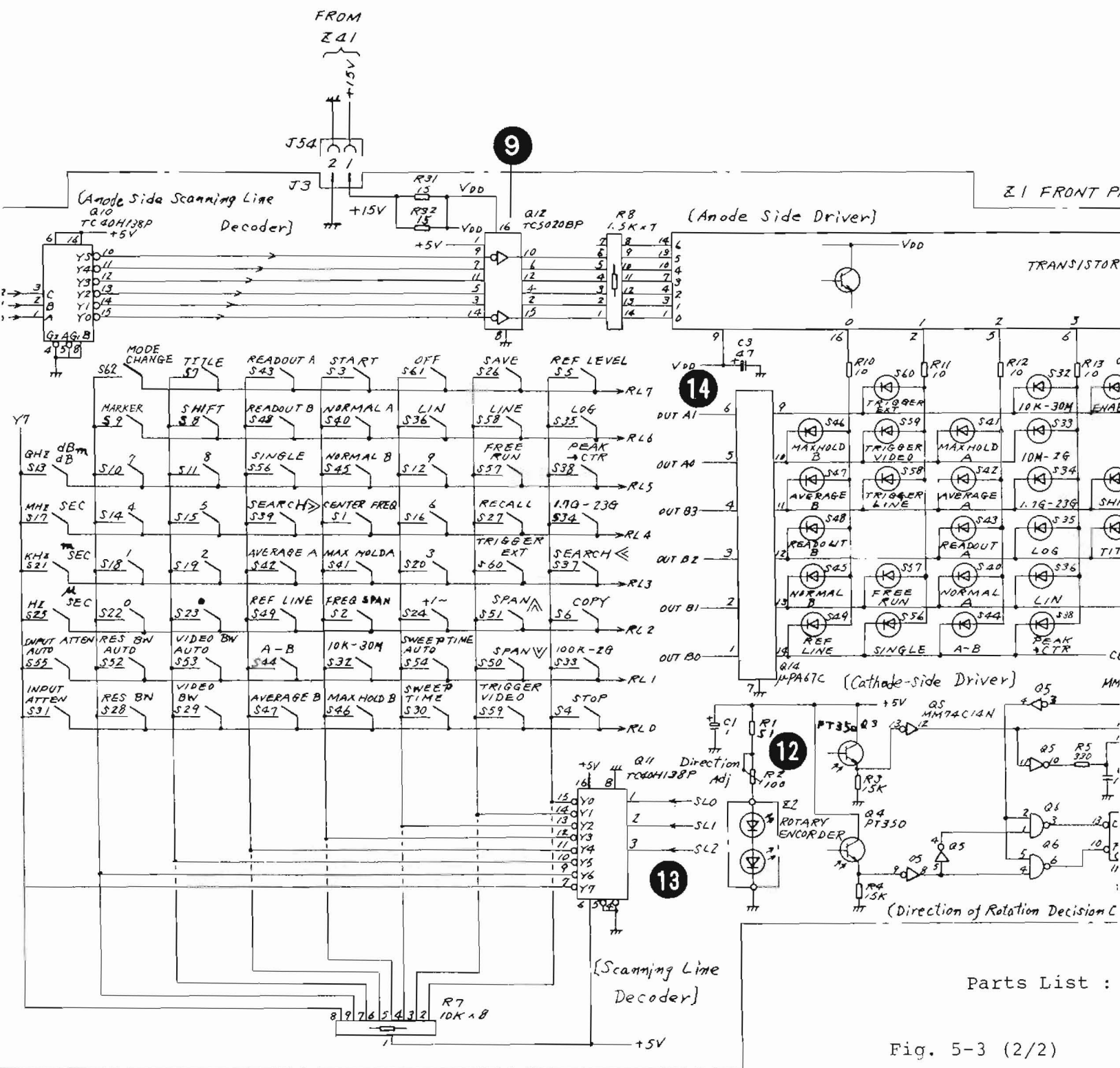


Fig. 5-3 (1/2)  
Z1 FRONT PANEL  
Circuit Diagram  
(43W 33934, 44







Parts List :

Fig. 5-3 (2/2)

Z1 FRONT PANEL I, 2  
Circuit Diagram (2,  
(43W 33934, 44W 84:



5.4

Z3 RF ATT  
Z5 YTF  
Z6  $\mu$  1st CONVERTER  
Z7 COUPLER (MS710C/D only)  
(Z4 is not assigned)

All these components are mounted on a vertical chassis. This component-mounted chassis can be removed from the top. Simply remove the top plate, bottom plate, right-side plate, and the vertical chassis by loosening the screws that hold it on the main chassis.

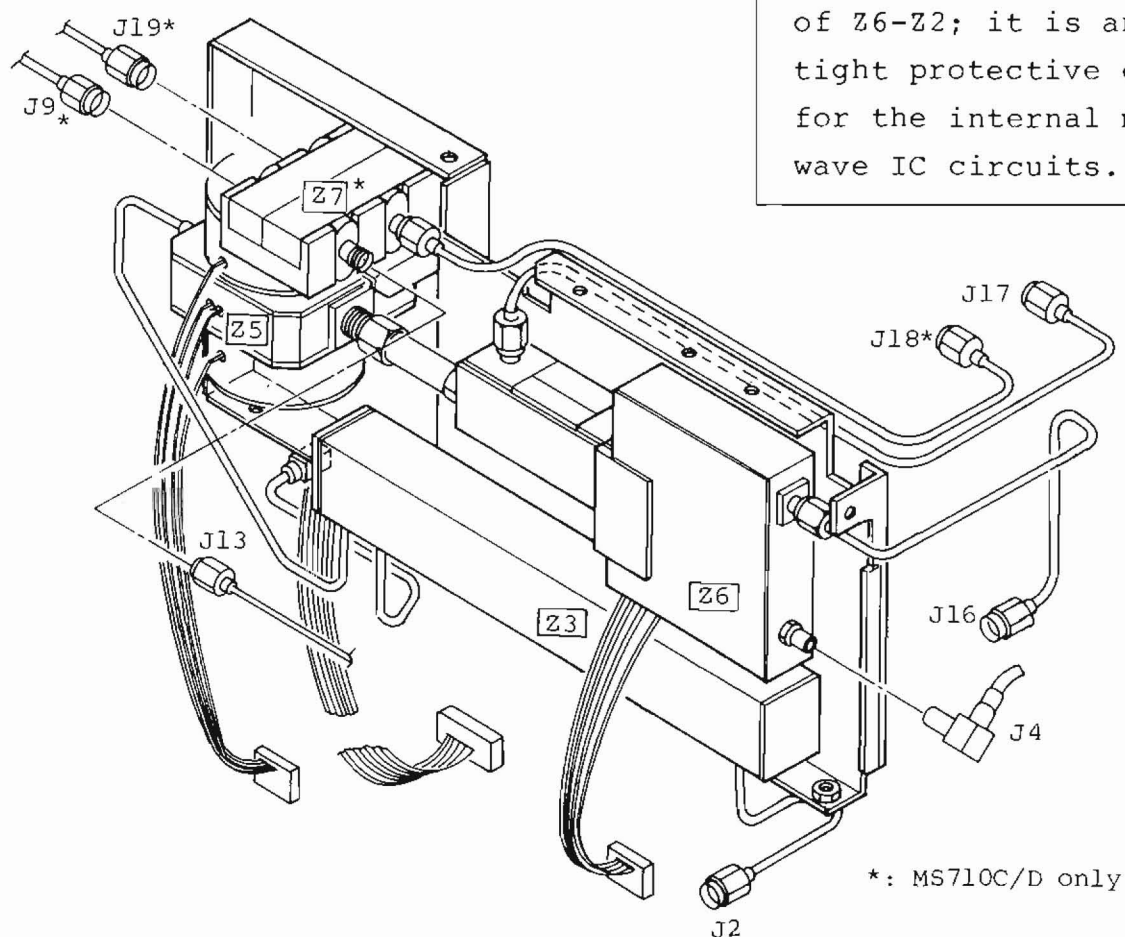


Fig. 5-4 RF Input Circuit Components Layout

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CAUTION

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1. The Z6-Z22 harmonic mixer is sealed airtight; it is a microwave IC component. Do not remove the protective cover of this component. The user must not attempt any repairs of this component. If this component is assumed to be faulty, replace the entire Z6 or return it for factory inspection and repair.
  2. The vertical chassis upon which Z3 to Z6 are mounted can be removed by disconnecting the cable and removing the setscrews that secure this block. It is not necessary to remove the entire front panel (Fig. 5-1 shown before).
  3. When disconnecting the connectors used to connect Z5 and Z6, do not apply excessive force.
- 

#### 5.4.1 Circuit description - Z3, Z5, and Z6

(Refer to Fig. 3-3 (1/4), Fig. 3-3 (4/4), Figs. 5-5 to 5-8)

The measurement signals from the front-panel RF-INPUT terminal J1 are sent to the Z3 RF ATT (attenuator and switch) through the J2 cable. The input signals are sent by the switch in Z3 to the Z14 0 to 2 GHz RF block through the switch in Z35 LOW 1st MIX for 100 kHz to 2 GHz band and to the Z5 YTF through the J3 cable for the 1.7 to 23 GHz band.

Attenuation select and switch changeover signals of the Z3 RF ATT/SW are supplied through the driver circuit mounted on the Z34 DIGITAL MEMORY/GP-IB PC board with the control signals generated by the Z26 CPU board. Z5 YTF is

the YIG-tuned filter whose center frequency corresponds to the measurement frequency, and functions as the preselector for the 1.7 to 23 GHz band. The Z5 output is sent directly to the Z6  $\mu$  1st converter input Z6-J1. Z5 YTF tuning signals and heater power signals are supplied from the Z10 YTO YTF driver.

As shown in circuit diagram Fig. 5-5, Z6-Z1 local AMP amplifies the output of the 2.2 to 6 GHz local oscillator (Z9 YTO) sent through J2. This output is then sent to the harmonic mixer Z6-Z2 along with the 1.7 to 23 GHz input RF signals sent through Z6-J1 by using the internal coupler W1.

The harmonic mixer Z6-Z2 performs up to the fourth-order of harmonic mixing, depending on the input RF signal frequency, and converts this signal into 521.4 MHz first IF signals. First IF signals are amplified by approximately 20 dB by the Z6-Z3 IF amplifier and are output to the J4 output terminal. Then, IF signals are sent to the Z18  $\mu$  2nd converter 1.

The power voltage (+15 V) and mixer bias current are supplied from the Z21 local control 1 through J5.

#### 5.4.2 Checking procedure - Z3, Z5, and Z6

Step	Procedure
1.	See Fig. 2-1; remove the bottom cover.
2.	Apply a test signal of approximately 2 GHz to the RF input of MS710[ ].



(cont.)

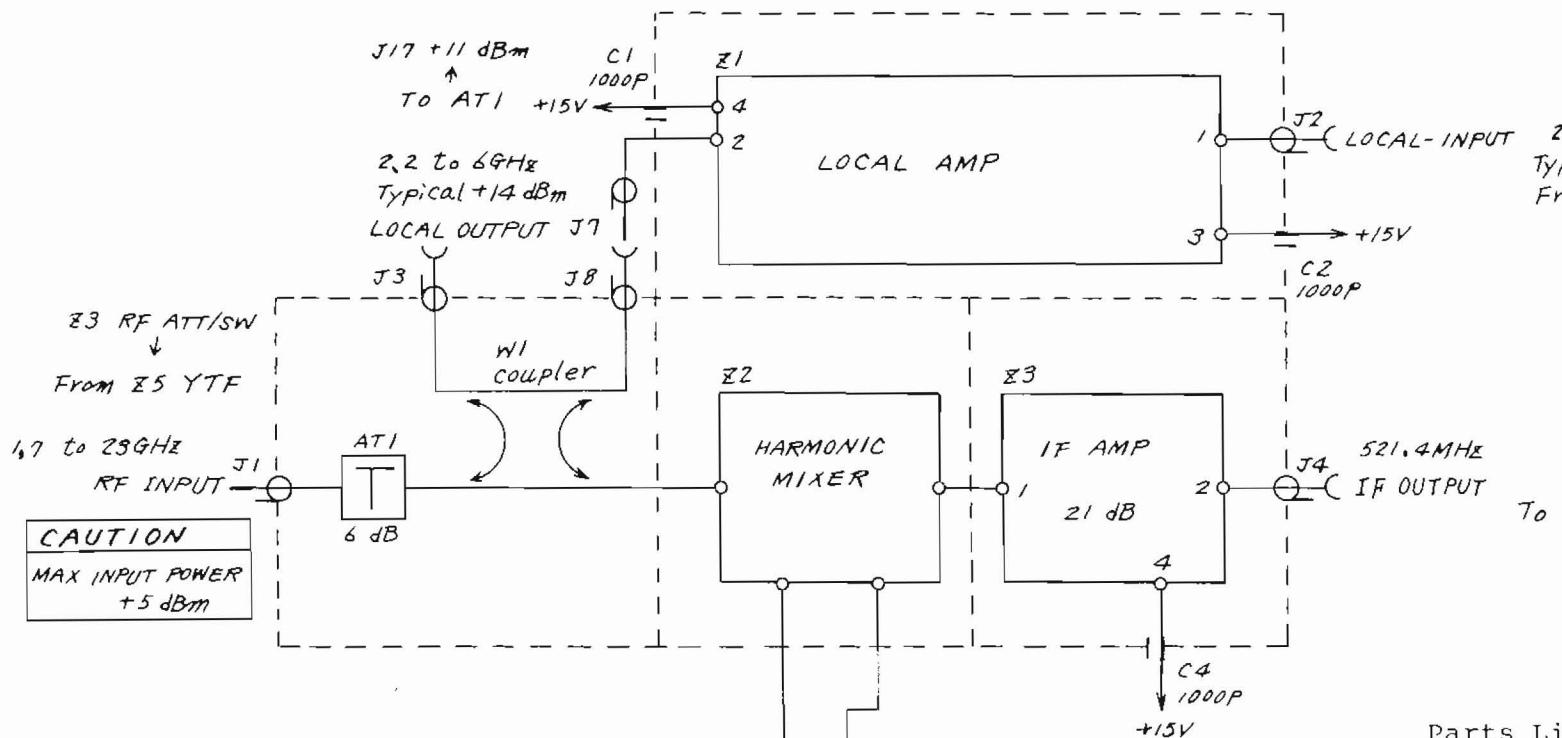
Step	Procedure
3.	Disconnect the semirigid cable connected to the Z3 output ports (Z3-J2 and Z3-J3) and check the Z3 output with another spectrum analyzer. Confirm that input signals are sent to the Z3 correct output port at the proper attenuation.
4.	If an abnormality is detected during the check described in Item 3, it is assumed that the Z3 or the Z34 driver circuits are faulty, or, the Z26 control signal generation circuit is faulty. See the related sections on Z34 and Z26 for details on their checking procedures.
5.	See Fig. 2-4; remove the top cover.
6.	Set the center frequency to the input signal frequency and set the span to zero.
7.	Observe Z6-J4 IF output by using another spectrum analyzer. When the input signal frequency is set within the fundamental wave mixing range (1.7 to 6.5 GHz), parts Z3 to Z6 are assumed to be normal if the level of the generated IF signal is roughly equivalent to (input signal level - INPUT ATTEN) and the frequency is 521.4 MHz. In this case, the preselector peak must be adjusted to obtain maximum output.
8.	Disconnect the J16 (connected to Z6-J2) cable. Then check the local signal input from Z9 YTO to Z6-Z1 and the related level (+12 dBm Typical).

(cont.)

Step	Procedure
9.	Disconnect the J17 (AT1 output) cable. Then check the AT1 output level (+11 dBm Typical). When the signal described in Item 8 is normal and this output is abnormal, the Z6-Z1 local amplifier is faulty.
10.	If Z5 YTF operation is abnormal, first check the Z10 YTO/YTF driver circuit (paragraph 5.5).
11.	The Z6 $\mu$ 1st converter can be analyzed by checking the signal level shown in Fig. 5-5.

#### 5.4.3 Adjustment - Z3, Z5 and Z6

These components require no special adjustments. Z6-Z2 harmonic mixer bias and the frequency characteristics of conversion loss are adjusted by using the Z21 local control 1 PC board.



TYPICAL CONVERSION GAIN (J1 to J4)

RF FREQ. (GHz)	HARMONIC	CONV. GAIN
1.7 to 6.5	1	+4 dB
6.5 to 12.5	2	-2 dB
12.5 to 18.5	3	-5 dB
18.5 to 23	4	-10 dB

Parts Li

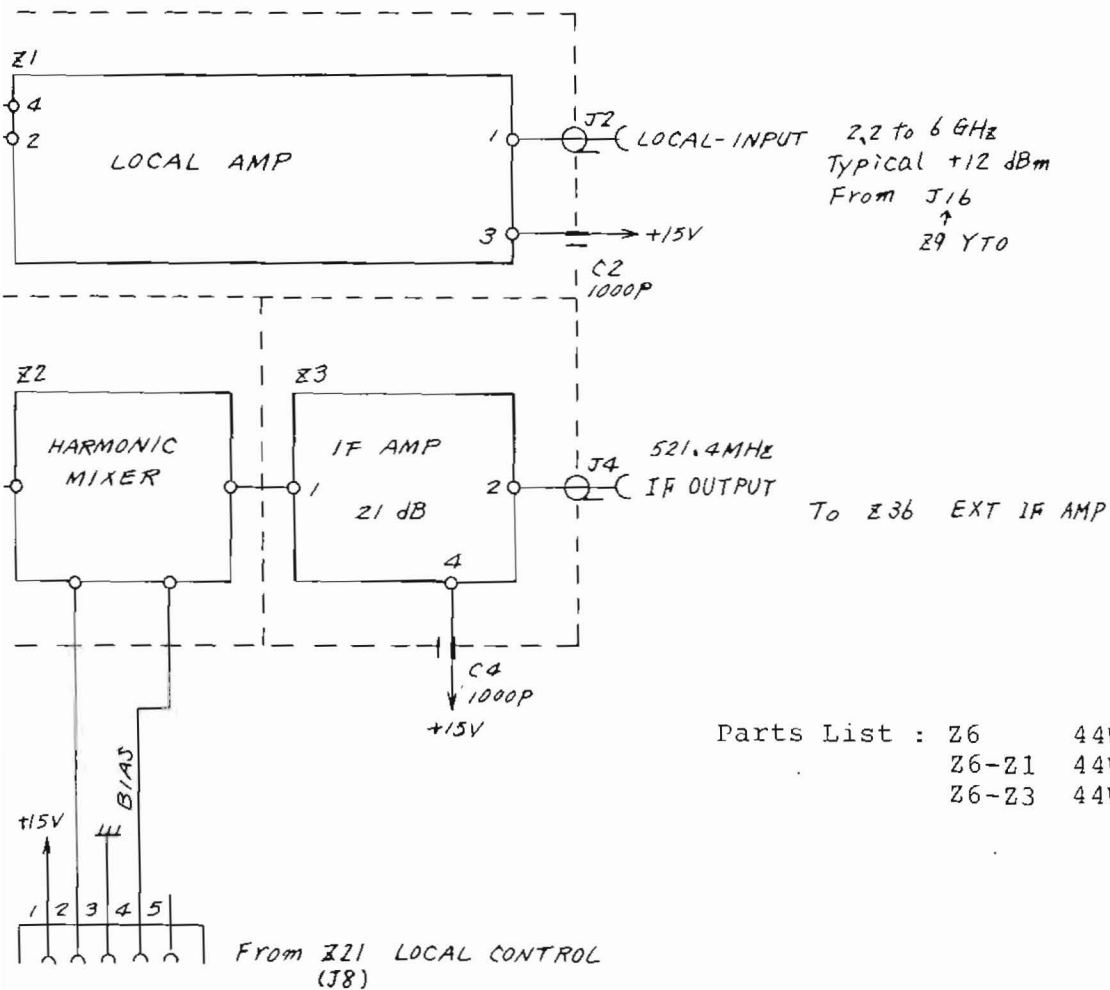
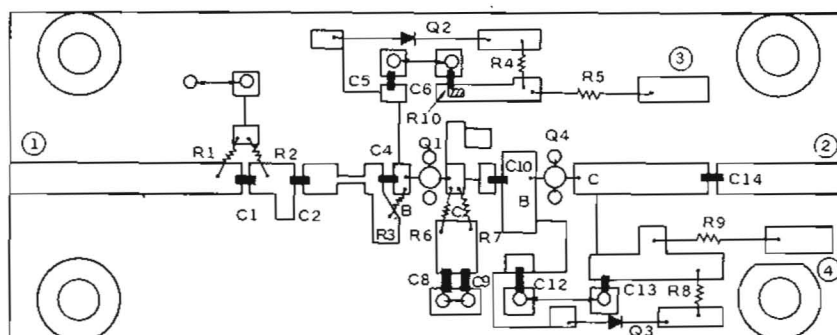
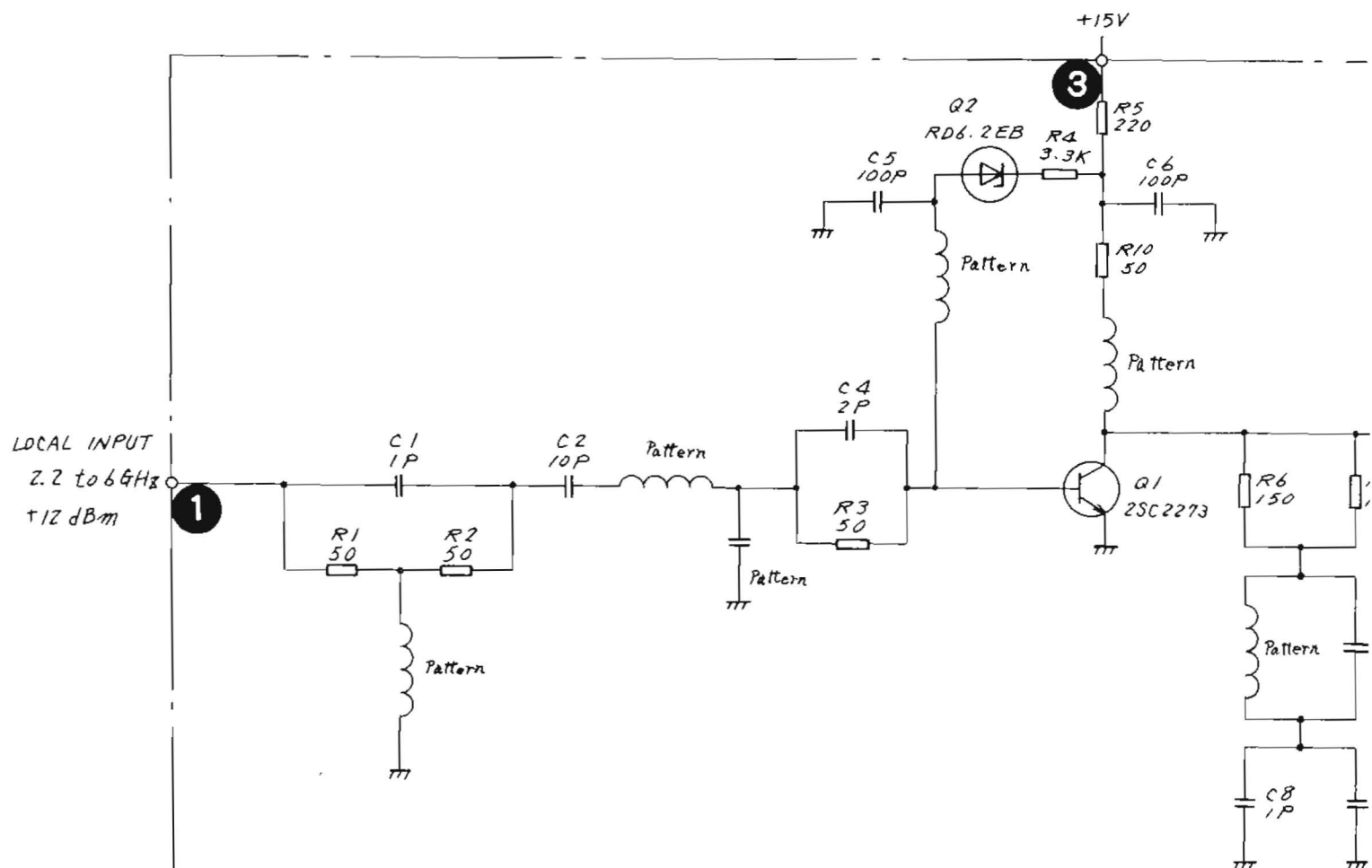
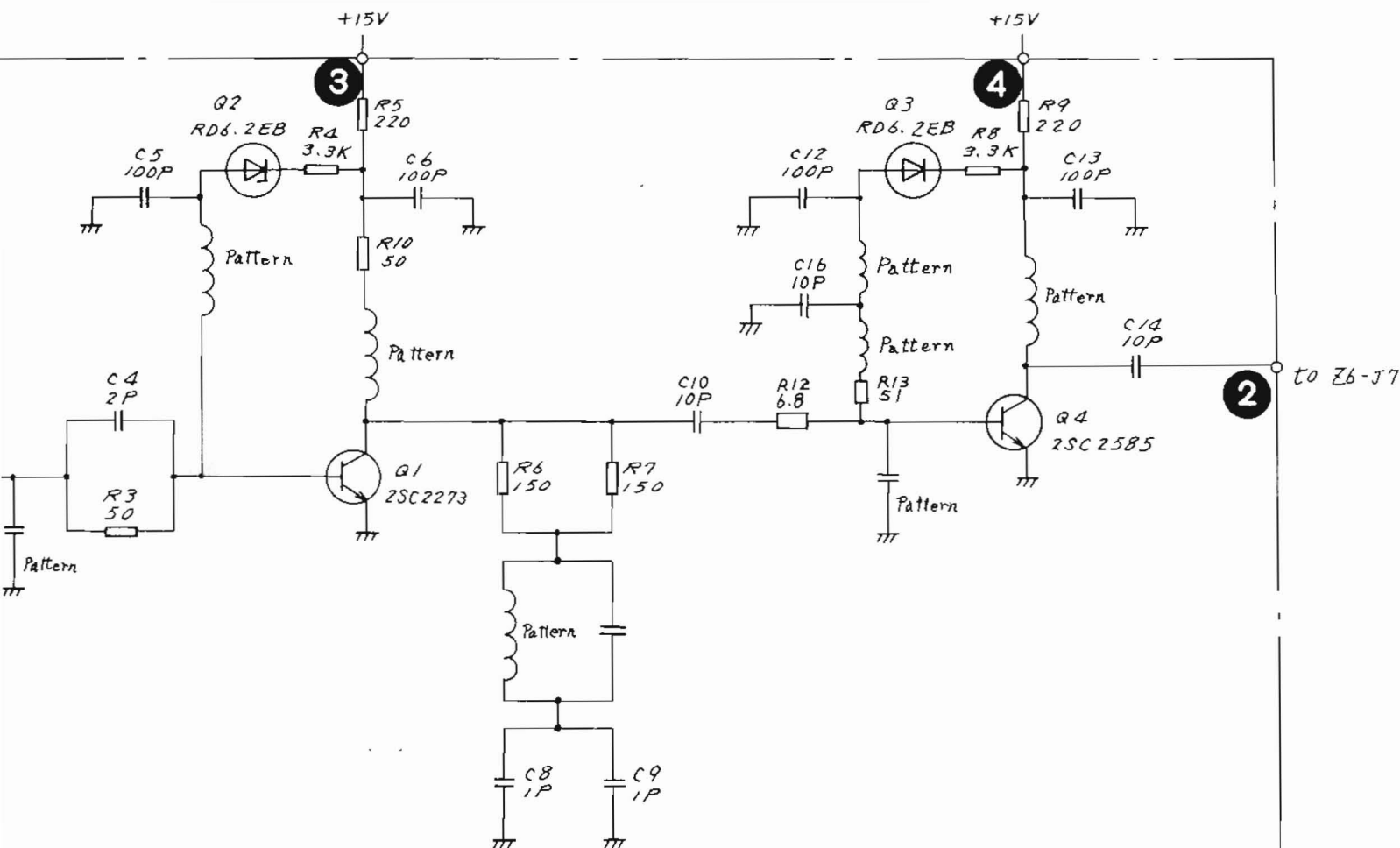


Fig. 5-5 Z6  $\mu$  1st CONVERTER  
Circuit Diagram  
(43W 33935)





PC Board : 442U 83819

Parts List : 44W 83924

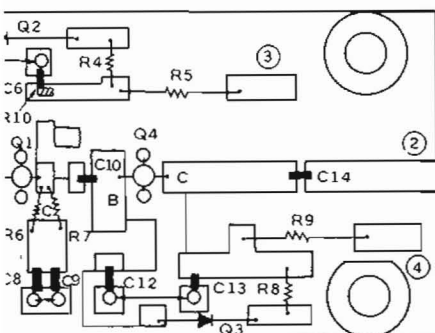


Fig. 5-6 Z6-Z1 LOCAL AMP  
Circuit Diagram  
and Parts Layout  
(43W 33936)

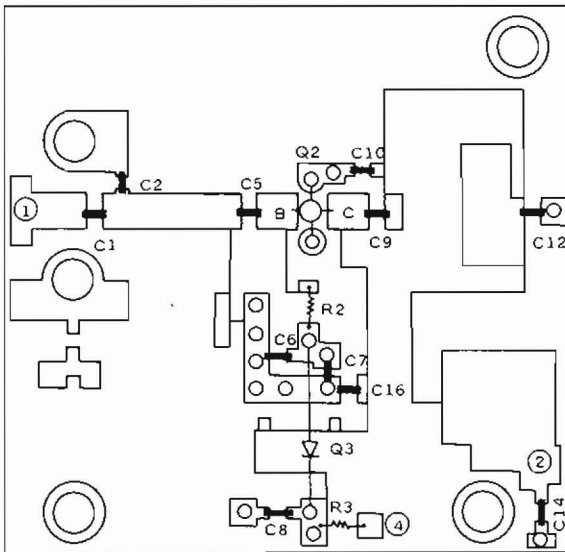


Fig. 5-7 Z6-Z3 IF AMP Parts Layout

PC Board : 442U 83821

Parts List : 44W 83925

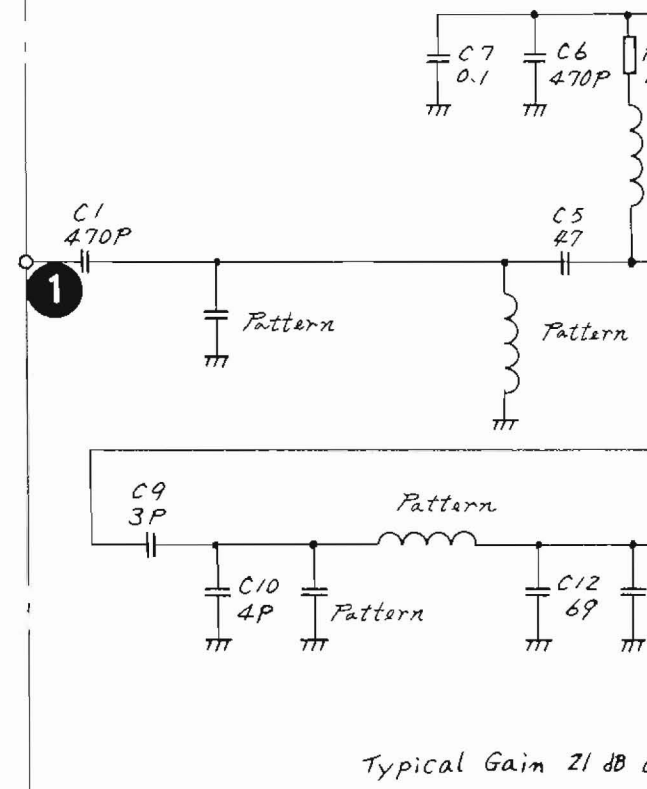


Fig. 5-8 Z6-Z3 IF AMP Circuit

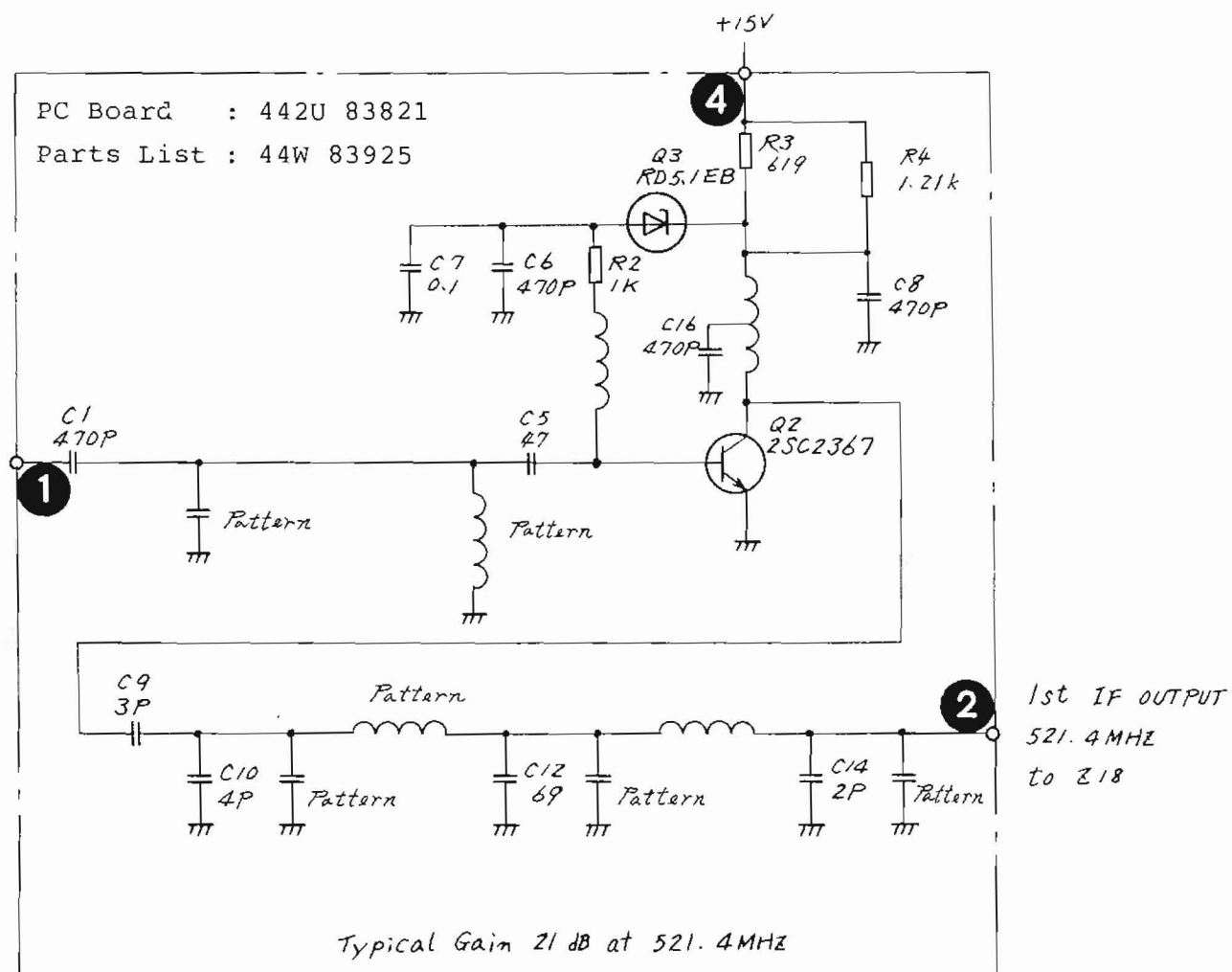


Fig. 5-8 Z6-Z3 IF AMP Circuit Diagram (43W84112)



## 5.5 Z9 YTO, Z10 YTO/YTF DRIVER

### 5.5.1 Circuit description - Z9, Z10

(Refer to Fig. 3-3 (1/4), Fig. 3-3 (4/4), Figs. 5-10 to 5-17)

Z9 YTO is the 2.2 to 6 GHz YIG-tuned oscillator used to generate the MS710[ ]'s first local signal. The power and tuning signals of this YTO are supplied from the Z10 YTO/ YTF driver. The first local signal is sent through the local amplifier Z6-Z1 and coupler Z6-W1 in the Z6  $\mu$  1st converter and the coupler Z7 (paragraph 5.4) to the Z14 0 to 2 GHz RF block and Z16 PLL block. Z9 and Z10 are mounted on the Z14 0 to 2 GHz RF block shown in Fig. 5-9.

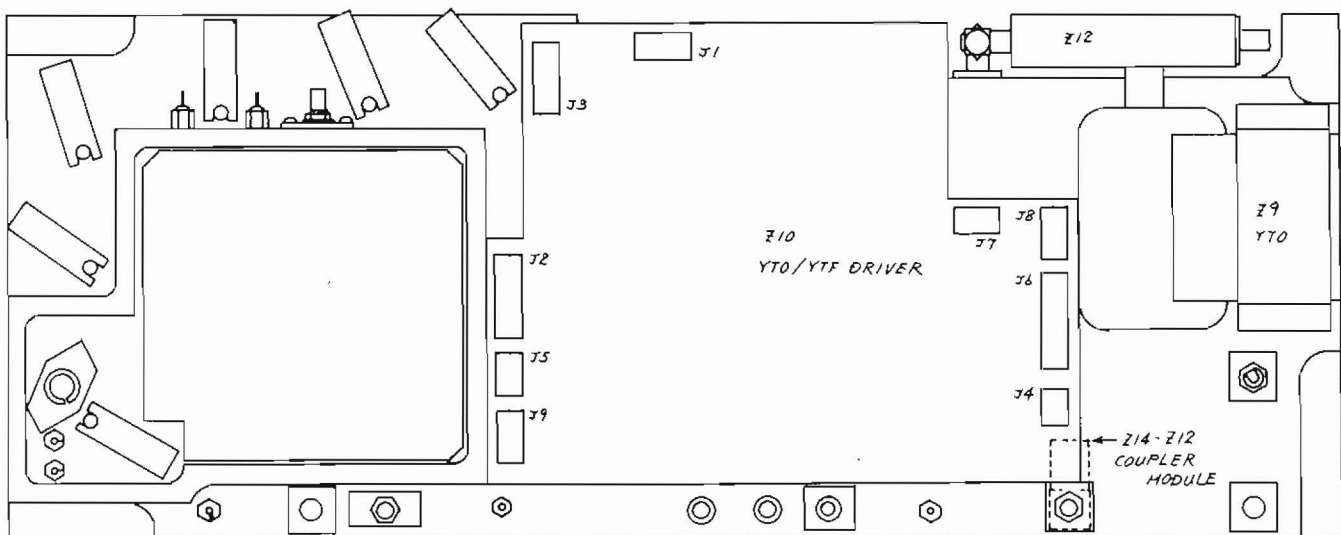


Fig. 5-9 Z9, Z10, and Z14-Z12 Parts Layout

A conversion circuit on the Z10 YTO/YTF driver PC board (Fig. 5-16) is used to convert local signal frequency control signals generated by the Z21 local control 1 circuit and Z16 PLL block, into drive signals required by Z9 YTO.

The circuit on the Z10 is divided into the main coil driver circuit with Q11, Q12, and Q13 and the FM coil driver circuit with Q15, Q16, and Q17. The main tune signal (MT) from the Z21 that determines Z9 YTO frequency is input to the main coil driver circuit of Z10 through the Z10-J2 connector.

A frequency sweep in the start/stop mode, in which the sweep width exceeds 2 GHz, is performed by directly varying the MT signal. (See Fig. 5-10, and 5-12.)

When the SPAN ranges from 200 MHz/div to 2.1 MHz/div in the fundamental mixing range, the main tune (MT) signal is fixed to the value corresponding to the center frequency. A sweep is performed by adding the main sweep (MSWP) sent from Z21 through Z10-J2 to the main coil driver circuit. (See Figs. 5-10 and 5-14.)

The YTOC signal is also sent to the main coil driver and is used as an offset signal to correct YTO frequency deviation.

The main coil driver circuit is the voltage-current conversion circuit used to convert the sum of the MT, MSWP, and YTOC signals into YTO main coil drive current.

When the SPAN ranges from 2.0 MHz/div to 101 kHz/div in the fundamental mixing range, the MT is fixed to the value corresponding to the center frequency and MSWP is fixed to 0 V. Sweeps are performed by FM coil sweep (FM SWP) signals. The FM coil driver circuit converts FM SWP signals into YTO FM coil drive current. (See Figs. 5-10 and 5-15.)

A PLL signal is sent to the Z10 FM coil driver circuit to accurately maintain the local frequency. When the SPAN is set to a narrower fundamental mixing range less than or equal to 100 kHz/div, the FM SWP signal is set to 0 V and the PLL circuit reference frequency is used in a sweeping.

Consequently, the local frequency is obtained through driving the YTO FM coil by using these PLL signals. (See Figs. 5-10 and 5-15.)

The circuit with Z10-Q3 and Z10-Q5 controls the YTO built-in heater, and the heater voltage (H) is controlled by a temperature sensor(T).

The circuit with Z10-Q20, Z10-Q21, and Z10-Q22 is the Z5 YTF (preselector) drive circuit described in paragraph 5.4.

This circuit adds the YTF tune (YTFT) signal sent from the Z21, the preselector peak signal sent from the front-panel preselector peak control (Z1-R18) through Z21, and the signal for the preselector auto tuning sent from Z34. Then, these signals are supplied to the Z5 YTF tuning coil through the voltage current conversion circuit (Fig. 5-11).

The relationship between YTO/YTF tuning, sweep control signals, and frequencies are shown in Figs. 5-10 and 5-11.

Z9 YTO oscillation frequency is obtained by setting the MS710[ ] to ZERO SPAN and measuring the first local output on the rear panel.

### 5.5.2 Checking procedure - Z9, Z10

Step	Procedure
1.	When the right-side cover is removed according to Fig. 2-1, the location of parts can be seen as shown in Fig. 5-9.
2.	Set the MS710[ ] into resetting status (1.7 to 23 GHz full band sweep status) by pressing the 1.7 to 23 GHz band selection switch.
3.	Observe the voltage of Z10 checkpoints ① and ② (Figs. 5-16 and 5-17) on the oscilloscope and confirm as shown in Fig. 5-12.  If this signal is abnormal, the Z21 local control circuit is assumed to be faulty.  Note: Make sure that the voltage at checkpoints ① and ② is 1.7% and 5% less than that of the MT voltage and YTFT voltage, respectively.
4.	Observe the voltage at Z10 checkpoints ③ and ④. If the voltage is as shown in Fig. 5-13, the YTF driver circuit is normal.
5.	Select the STOP FREQUENCY as 5.478 GHz. (The indication is STOP:5.480 GHz. The START remains set to 1.700 GHz.)  This status is used when a sweep is performed for the entire band used by the YTO.
6.	Observe the voltage at Z10 checkpoints ① and ⑤ and confirm as shown in Fig. 5-14.

(cont.)

Step	Procedure
7.	Press the 100 kHz to the 2 GHz BAND switch and then press the SPAN switch.
8.	Observe the voltage at Z10 checkpoints ⑥ and ⑤ and confirm as shown in Fig. 5-14.
9.	Set the SPAN to 2 MHz/div.
10.	Observe the voltage at Z10 checkpoints ⑦ and ⑧ and confirm as shown in Fig. 5-15.
11.	If an abnormality occurs during the check described in Item 10, disconnect the PLL signal connector connected to Z10-J5 and repeat Item 10.
12.	<p>If a normal status results in Item 11, the Z16 PLL block is assumed to be faulty.</p> <p>In a normal operation status, voltage ⑨ appears as the waveform shown in Fig. 5-15.</p>
13.	Set the SPAN to 100 kHz/div.
14.	Observe the voltage at checkpoint ⑨ and check it as the lower waveform shown in Fig. 5-15.
15.	Check the voltage at Z10 checkpoints ⑩ and ⑪ . If each voltage is approximately +6 V and +4 V under normal environmental conditions (ambient temperature of approximately 25°C), it is normal.

### 5.5.3 Adjustment - Z9, Z10

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#### NOTE

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If the Z21 local control circuit operates normally and a valid control signal is input to Z10, the following method of adjustment is used. Unless already done, adjust Z21 first.

---

#### (1) Adjusting YTO Main Coil Driver

Step	Procedure
1.	Connect the MS710[ ] rear first local signal output to the microwave counter.
2.	Set the SPAN to ZERO SPAN.
3.	Disconnect the PLL signal connector connected to Z10-J5 and open Z10-J5.
4.	Set the center frequency to 1.700 GHz.
5.	Set the first local output frequency to 2.2214 GHz by adjusting Z10-R17 (offset adjustment).
6.	Set the center frequency to 5.470 GHz.
7.	Set the first local output frequency to 5.9914 GHz by adjusting Z9-R21 (sensitivity adjustment).
8.	Reduce the frequency error to less than 3 MHz by repeating steps 4 to 7.

---

(cont.)

Step	Procedure
9.	Set the center frequency to 3 GHz and SPAN to 200 MHz/div.
10.	Use the microwave signal generator to send 2 GHz and 4 GHz signals to the MS710[ ] and adjust Z10-R12 so that each signal can be displayed at the left (2 GHz) and right (4 GHz) ends of the CRT scale (main coil sweep sensitivity adjustment).

## (2) YTO FM Coil Driver Adjustment

Step	Procedure
1.	Set the center frequency to 3 GHz and SPAN to 2.0 MHz/div.
2.	Display the spectrum at the CRT central scale position by varying the frequency of the microwave signal source.
3.	Adjust Z9-R39 by varying the frequency of the microwave signal source by -10 MHz and +10 MHz so that the spectrum on the CRT can be displayed at the left (3 GHz - 10 MHz) and right (3 GHz + 10 MHz) ends (FM coil sweep sensitivity adjustment).

### (3) YTF Driver Adjustment

Step	Procedure
1.	Remove the Z10-J9 preselector auto signal connector and open Z10-J9.
2.	Send the Z10-J5 PLL signal as is.
3.	Align the front panel preselector peak knob to the center mark.
4.	Set the center frequency to 1.7 GHz and SPAN to 2 GHz/div.
5.	Use the microwave signal source to send 1.7 GHz signal to the MS710[ ] and adjust Z10-R48 to maximize the display level (offset adjustment).
6.	Set the MS710[ ] center frequency and microwave signal source frequency to 15 GHz.
7.	Adjust R46 to maximize the signal display level (sensitivity adjustment).
8.	Reduce the frequency error by repeating steps 4 to 7.
9.	Reset the Z9-J5 connection to its original state.



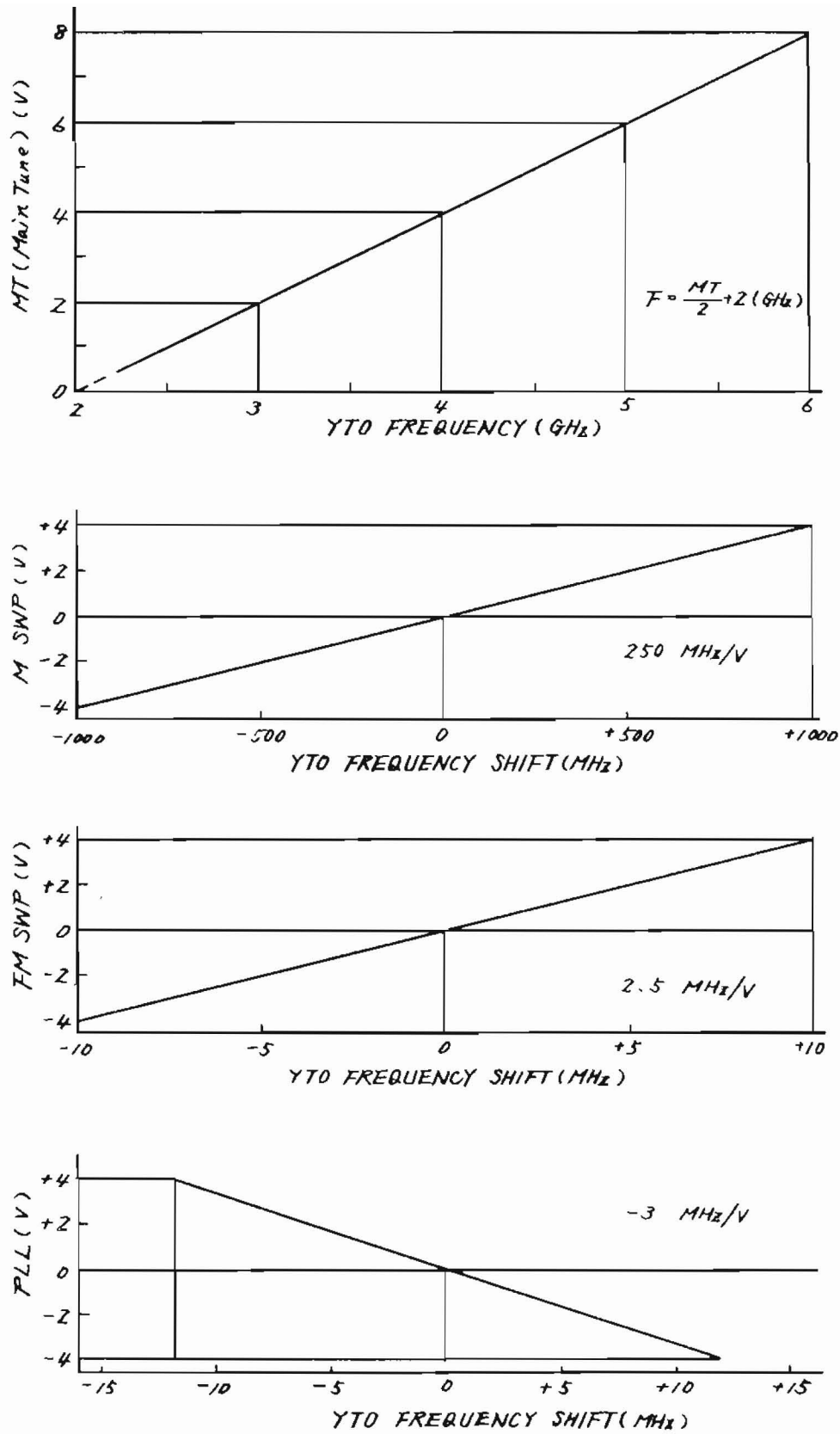


Fig. 5-10 YTO Frequency vs Control Voltage

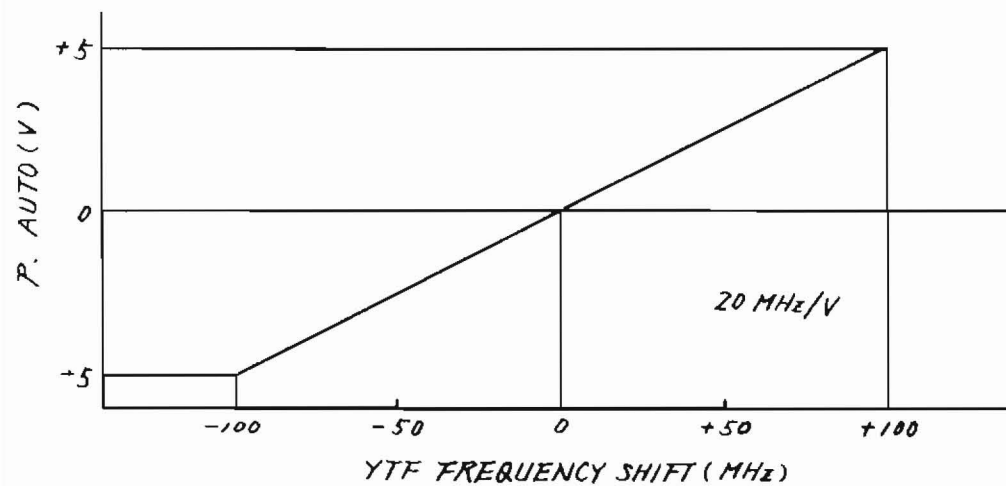
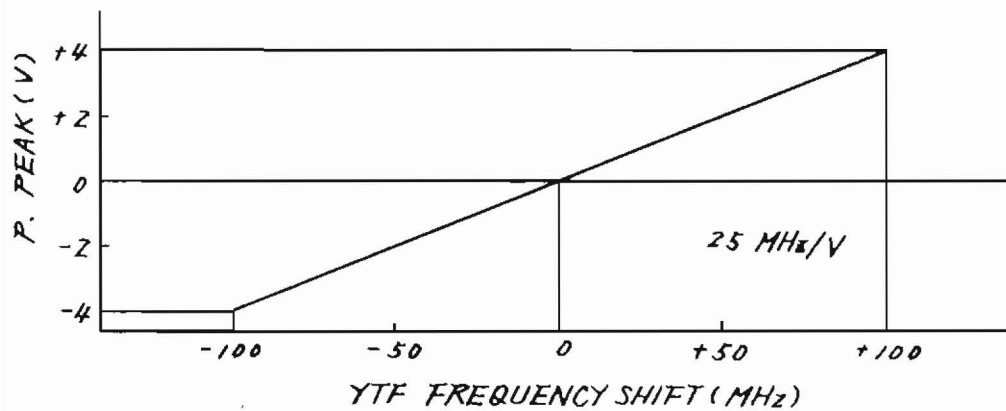
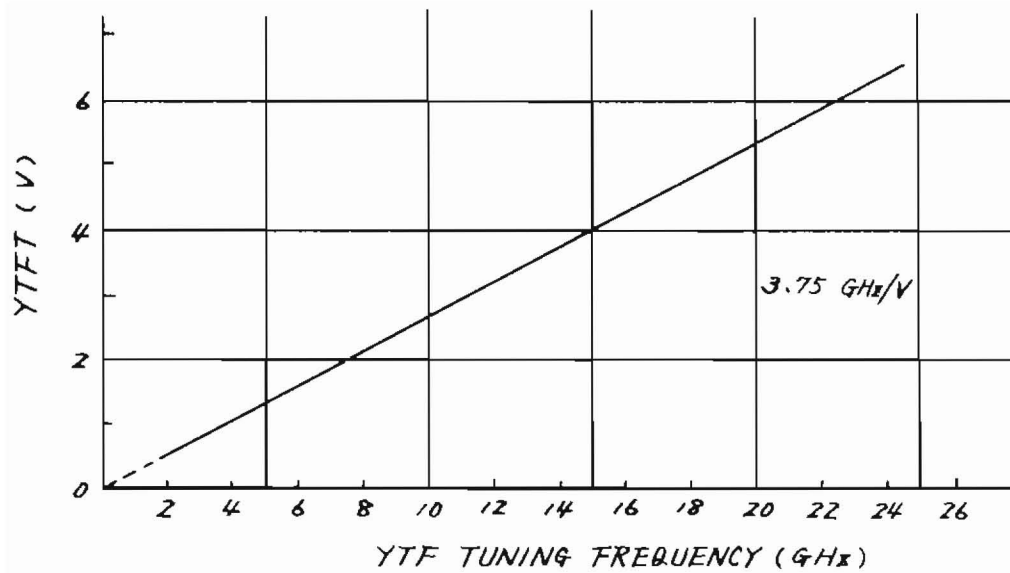


Fig. 5-11 YTF Tuning Frequency vs Control Voltage

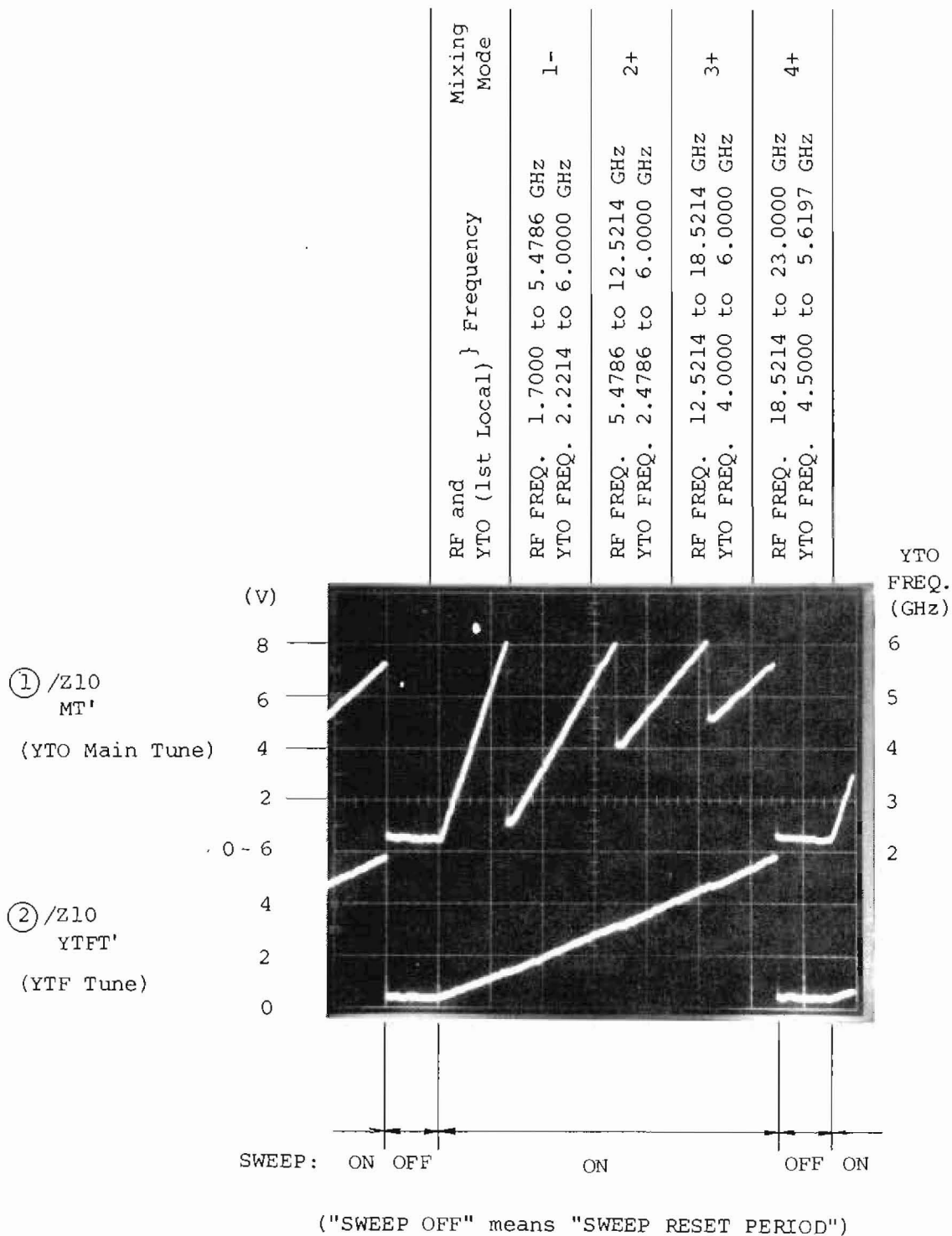


Fig. 5-12 YTO and YTF Tuning Signal during POWER ON RESET Status (1.7 to 23 GHz Full Band Sweep Status)

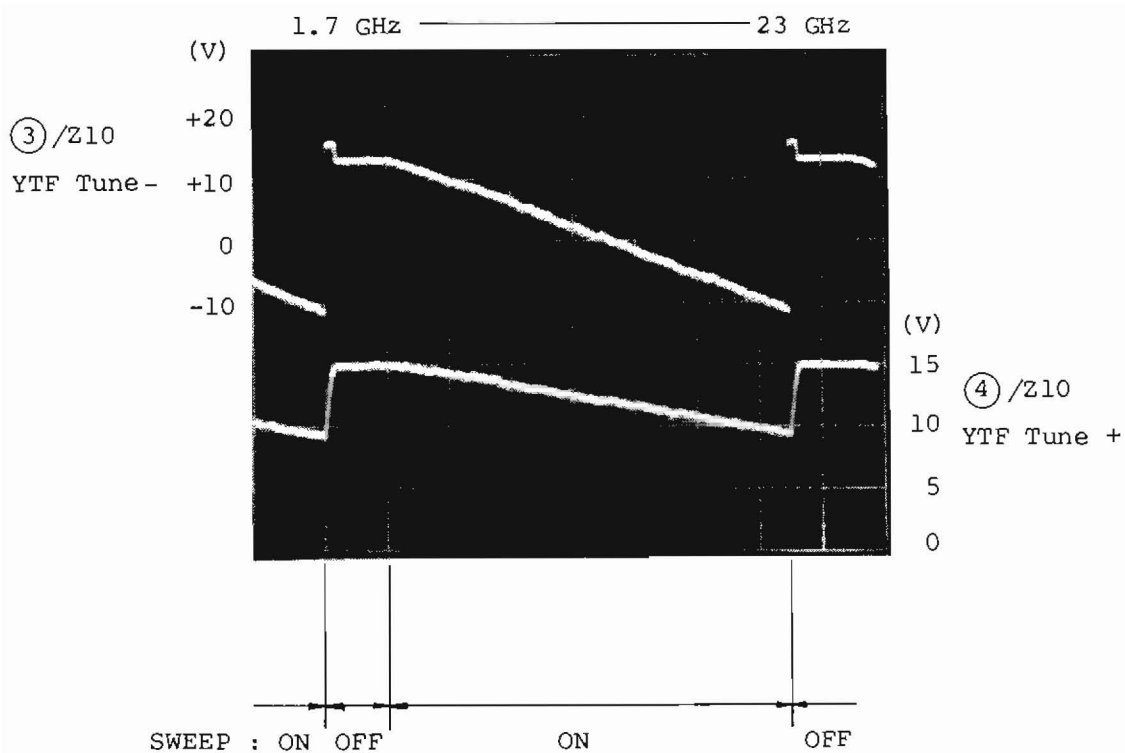
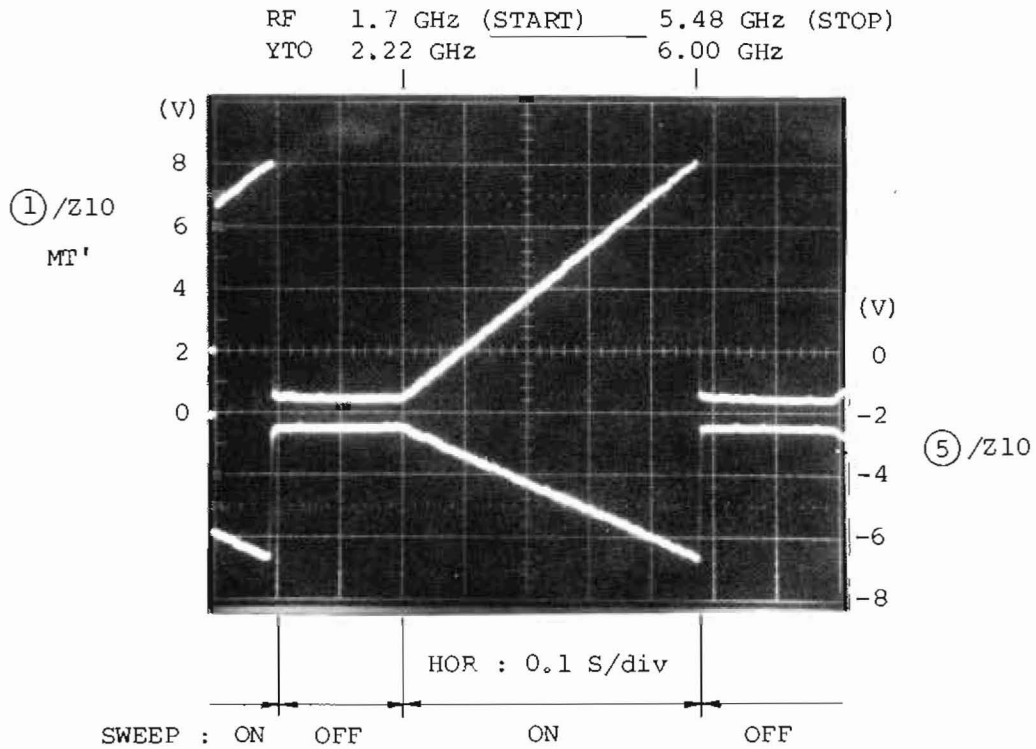


Fig. 5-13 YTF Driver Check Points  
(During POWER ON RESET Status,  
1.7 to 23 GHz Full Band Sweep Status)

A. YTO Full Sweep



B. 200 MHz/div

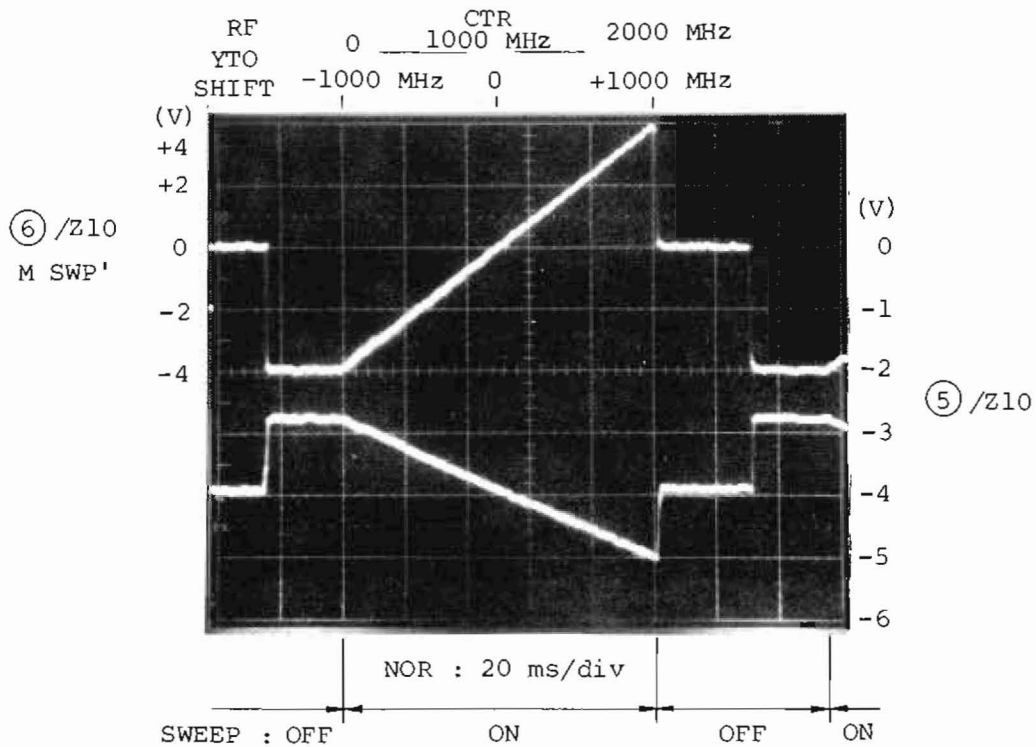
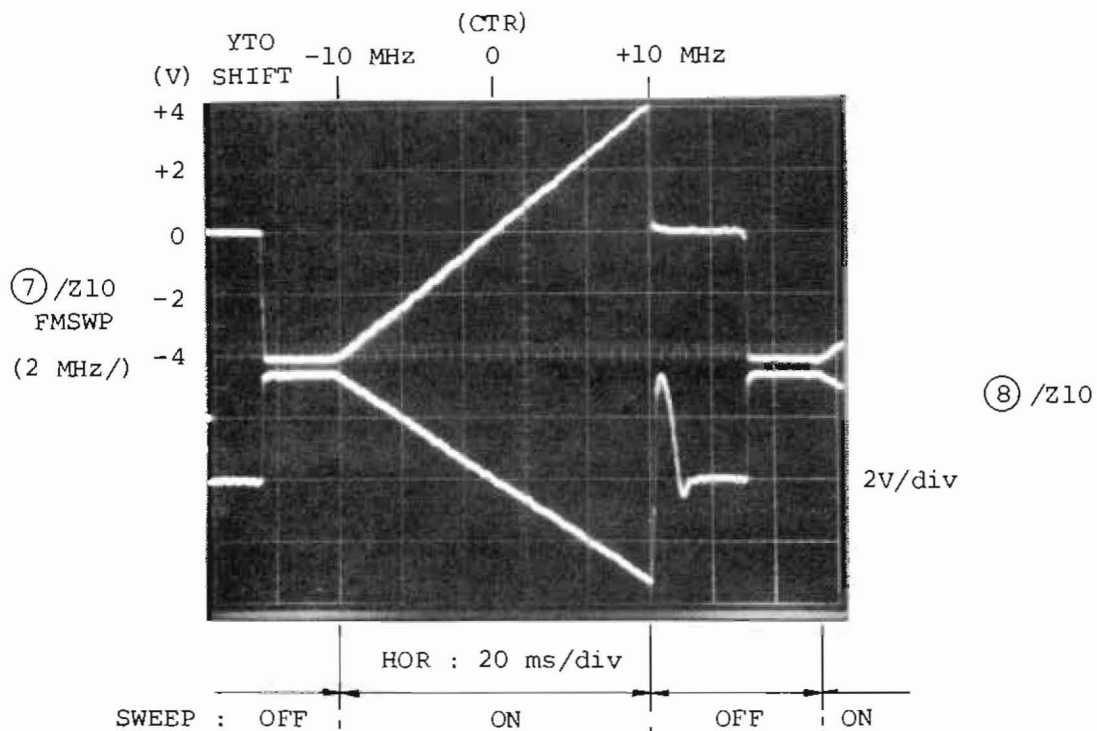


Fig. 5-14 YTO Main Coil Driver Check Points

A. FM Coil Sweep



B. PLL Signal

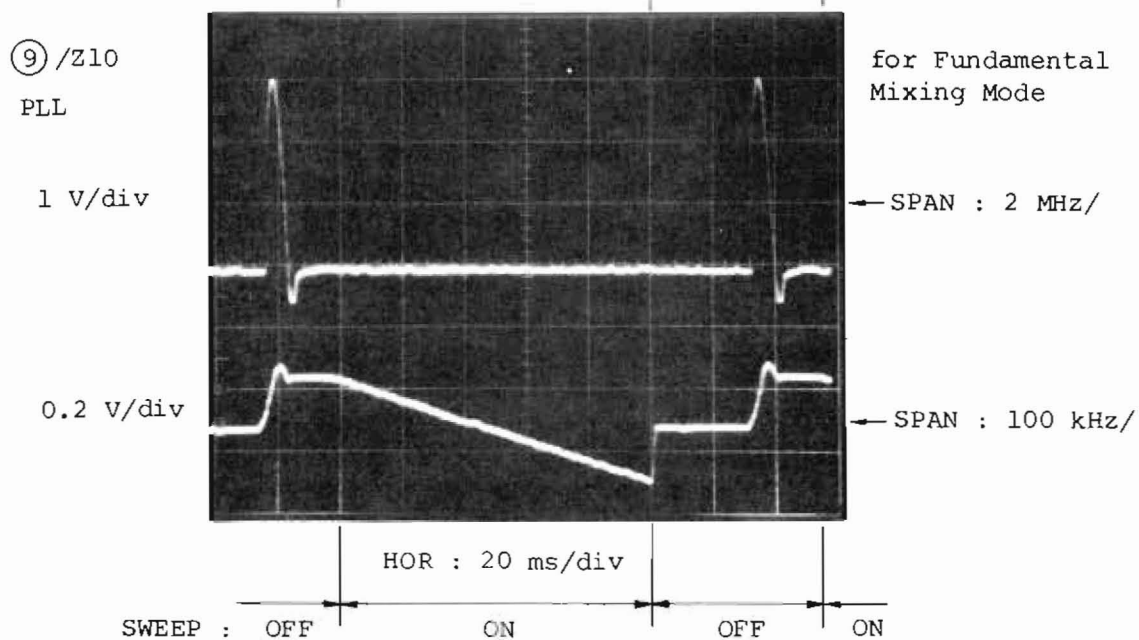


Fig. 5-15 YTO FM Coil Driver Check Points

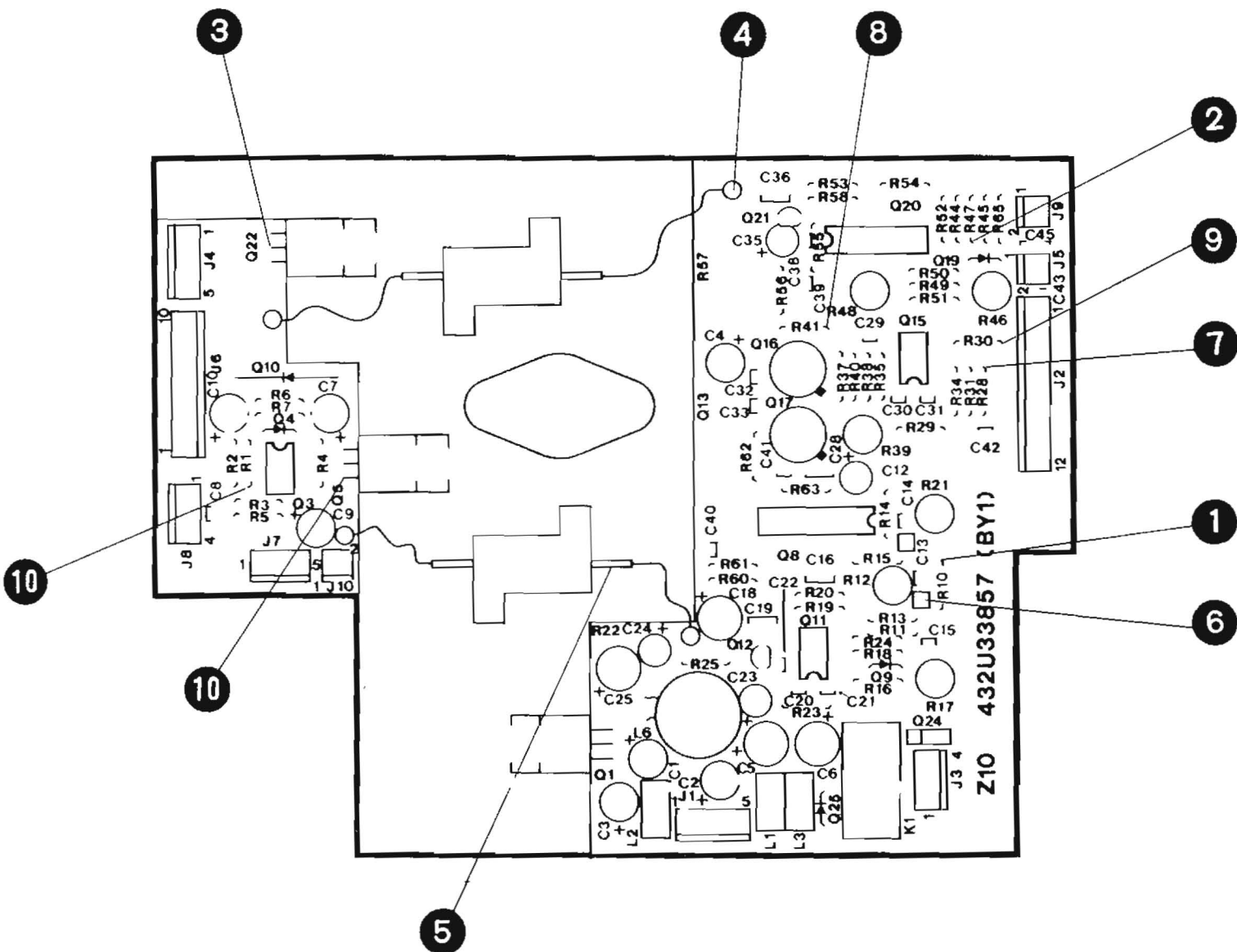
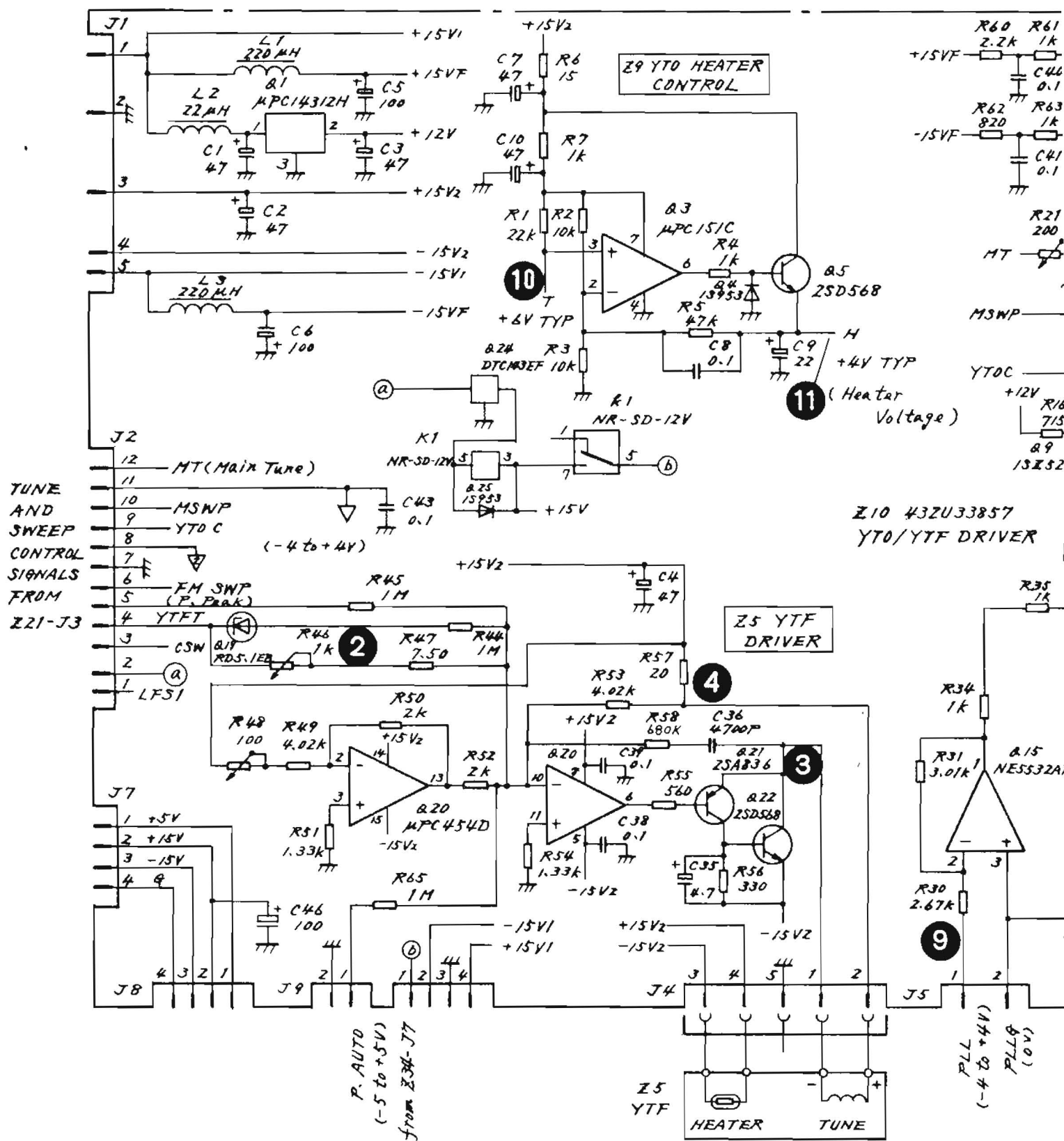
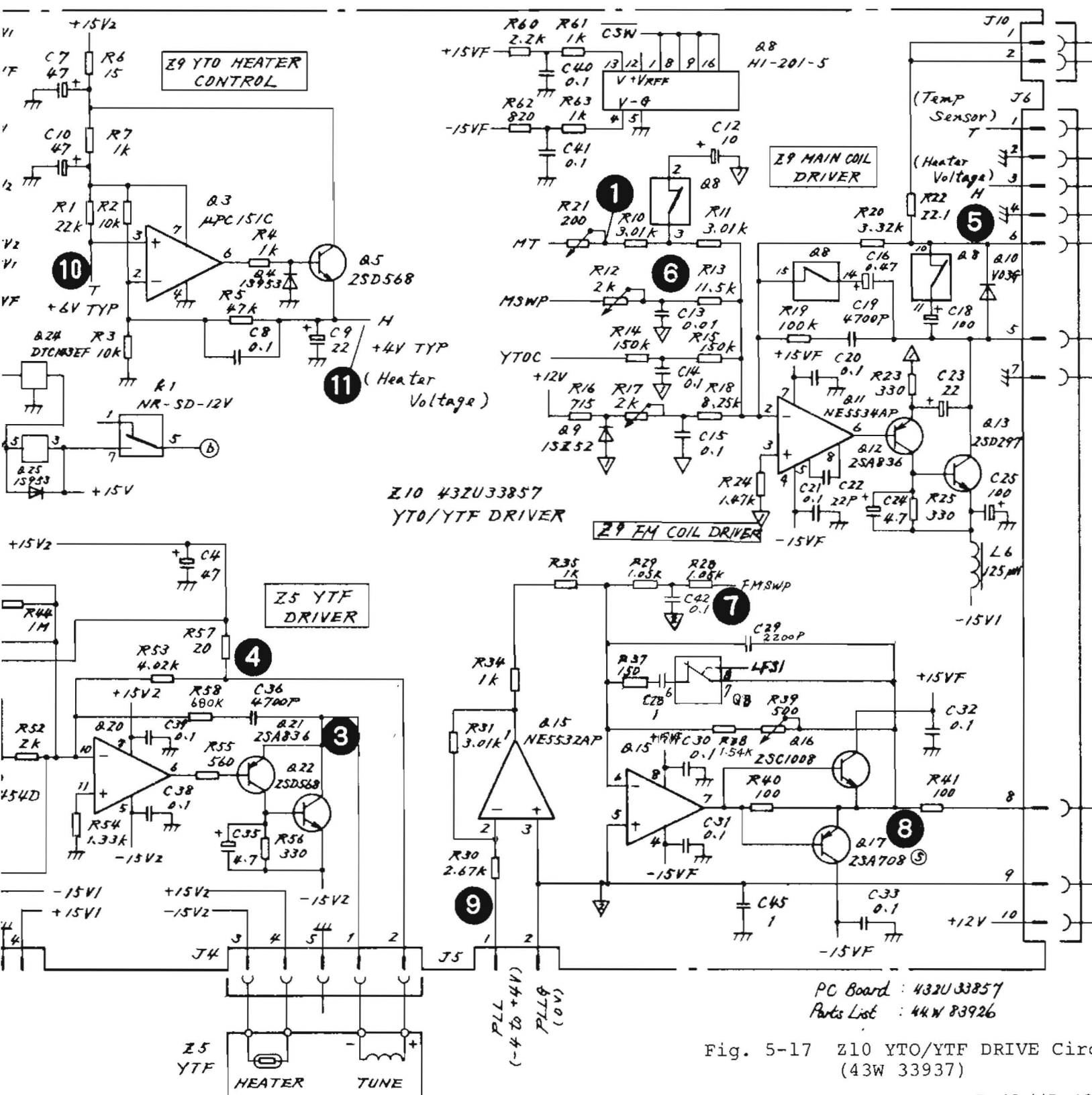


Fig. 5-16 Z10 Parts Layout







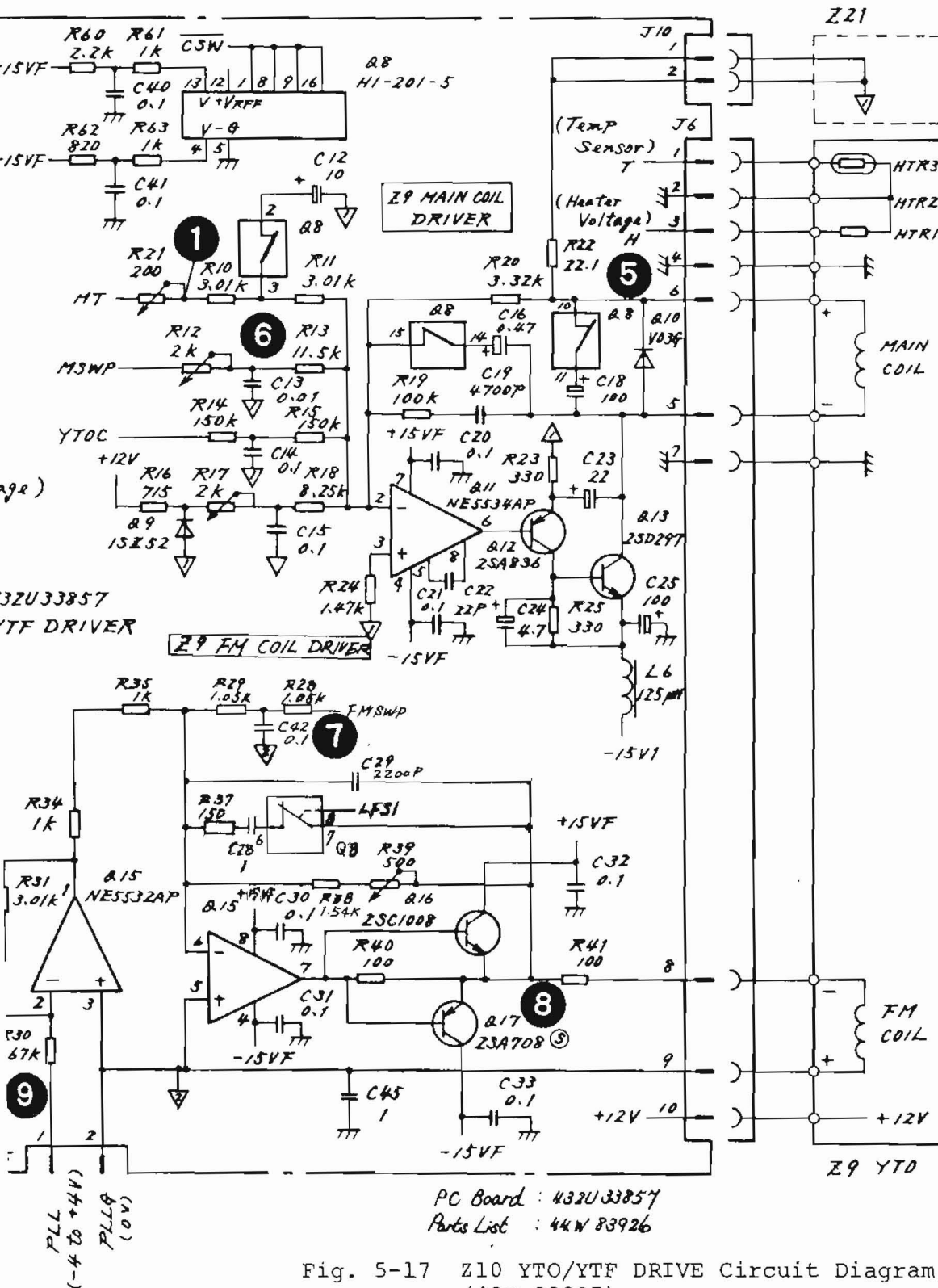


Fig. 5-17 Z10 YTO/YTF DRIVE Circuit Diagram  
 (43W 33937)

## 5.6 Z14 0 to 2 GHz RF Block

This block contains two frequency converters in an aluminum block case. The first converter perform up conversion of a 100 kHz to 2 GHz band input signal to a 2.5214 GHz IF signal. By mixing this with a 2.5 GHz second local signal, this is finally converted to the final IF 21.4 MHz signal.

The arrangement of this block's units (Z14-Z1 to Z14-Z12) is shown in Fig. 5-18.

### 5.6.1 Circuit description - Z14

(Refer to Figs. 3-3 (1/4) to 3-3 (4/4), Figs. 5-19 to 5-30)

When the 100 kHz to 2 GHz band is selected, the input RF signal passing through input circuit Z3 RF ATT/SW (paragraph 5.4) is sent to the Z12 2 GHz LPF via J7. This LPF functions as the preselector for the 100 kHz to 2 GHz band. The signal sent through the LPF is mixed with the first local signal amplified by the Z14-Z9 2.5 to 4.5 GHz LO AMP and is converted into a 2.5214 GHz first IF signal.

The first IF signal is amplified by approximately 10 dB by the Z14-Z4 2.5214 GHz preamplifier through the Z14-Z3 directional filter. The amplified first IF signal is sent to the Z14-Z7 2nd converter through the Z14-Z5 2.5214 GHz BPF, which consists of cavity resonators. The Z14-Z7 mixes this first IF signal with the 2.5 GHz second local signal from Z14-Z6, which is amplified by the 2.5 to 4.5 GHz LO amplifier on Z14-Z7. In this way, the Z14-Z7 converts the first IF signal into a 21.4 MHz final IF signal.

The IF signal is then sent from this RF block through Z14-J3 to the IF switching circuit of the Z19  $\mu$  2nd converter 2. The signal flow, gain, and loss at each part are shown in Fig. 5-19.

The Z14 also contains the Z14-Z8 100 MHz REF OSC oscillator circuit. This circuit is used to generate a 100 MHz signal which becomes the source signal of the Z14-Z11 2nd LOCAL PLL and Z16-Z8 5X multiplier circuits in the Z16 PLL Block. The front panel 100 MHz CAL OUTPUT signal is also supplied from this Z14-Z8. The power to the Z14 is supplied from Z10-J3 through Z14-J14.

#### 5.6.2 Checking procedure - Z14

Step	Procedure
1.	See Fig. 2-1; remove the top, bottom, and right-side covers.
2.	Before removing the Z14 from the main unit, check the I/O signal to this block as shown in Fig. 5-20 to determine whether or not this block is faulty.
3.	When a fault is clearly indicated in Z14, remove the screw that secures the block from the rear and bottom, as well as other Z14-mounted components.

---

#### CAUTION

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The Z12 2 GHz LPF and Z14-Z3 directional filter uses microwave circuits including a thin film circuit. Gold wires, not visible to the naked eye, are bonded on these substrates. Never touch the surface of these substrates with your hands or any other objects because the gold wires might be damaged.

---

(cont.)

Step	Procedure
4.	The cover of this RF block is divided into several parts. Therefore, remove only the cover of the required parts by referring to the layout shown in Fig. 5-18.
5.	Connect the extension cable to Z14-J14 to supply power from the MS710[ ] main unit.
6.	Supply local signals to Z14-J10 from the MS710[ ] main unit by using the extension cable.
7.	Apply the signal that corresponds to the input frequency at Z14-J1 to detect any faulty part by tracing the signal flow through each part as shown in Fig. 5-19.

#### 5.6.3 Adjustment - Z14

Adjust the following when the Z14 RF block is properly mounted on and connected to the MS710[ ] main unit.

(1) Z14-Z8 100 MHz REF OSC frequency adjustment

Measure the front panel CAL OUTPUT signal by using the frequency counter and adjust the trimmer screw through the frequency adjustment hole at the top of Z14 to obtain 100.000 MHz.

(2) Z14-Z8 100 MHz REF OSC level adjustment

Measure the output of the front panel CAL OUTPUT terminal with a power meter, and set it to a level of -10.0 dBm by turning VR(R14) on the Z14-Z8 through the level adjustment hole at the top of Z14 RF BLOCK.

(3) Z14-Z5 2.5214 GHz BPF adjustment

Step	Procedure
1.	Send MS710[ ] CAL OUTPUT signals to the RF input terminal.
2.	Set the center frequency to 100 MHz and SPAN to 1 MHz.
3.	Send the 21.4 MHz IF signal obtained from Z14-J4 to another spectrum analyzer which can measure the 21.4 MHz $\pm$ 5 MHz signal.
4.	Adjust the six trimmer screws of the Z14-Z5 so that a display like that in Fig. 5-20 can be obtained on the spectrum analyzer display used to measure the 21.4 MHz IF signal.

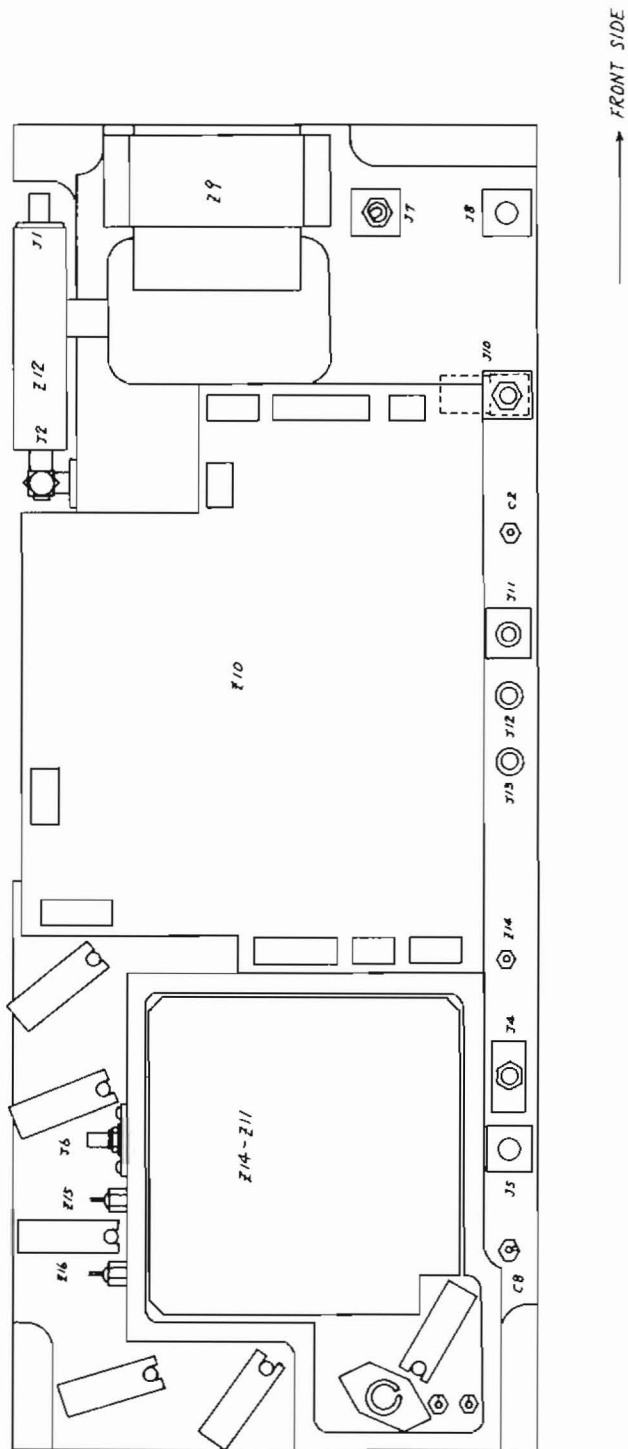


Fig. 5-18 (1/2) Z14 Parts Layout (1/2)

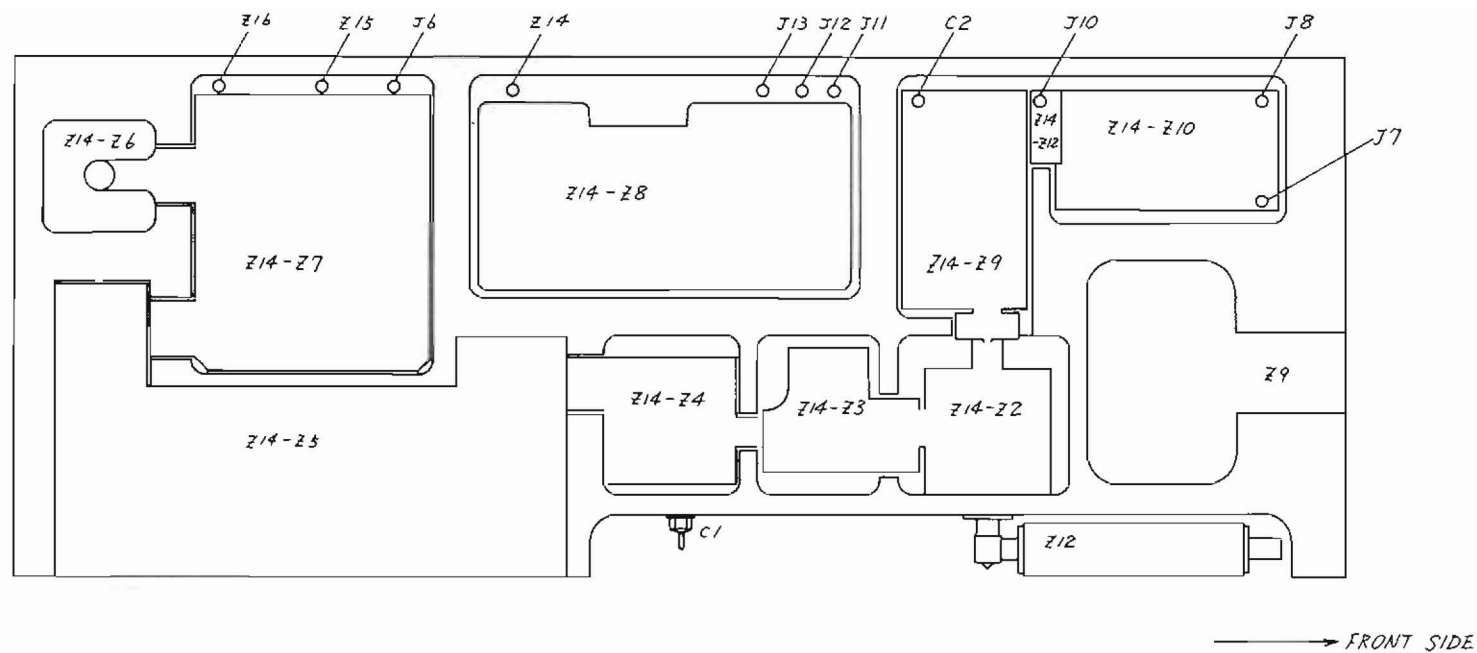
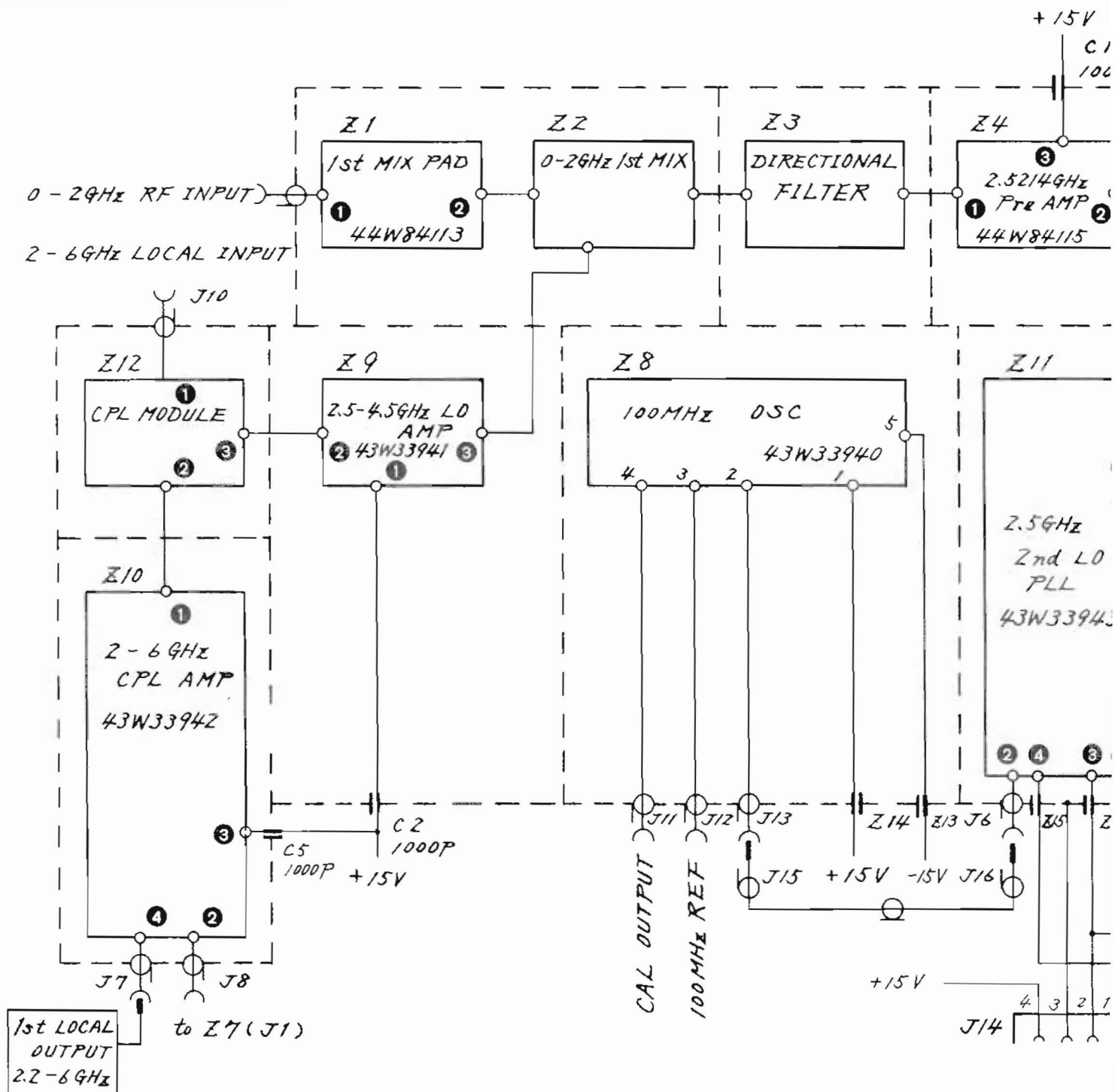


Fig. 5-18 (2/2) Z14 Parts Layout (2/2)





Parts List ; 44W83928

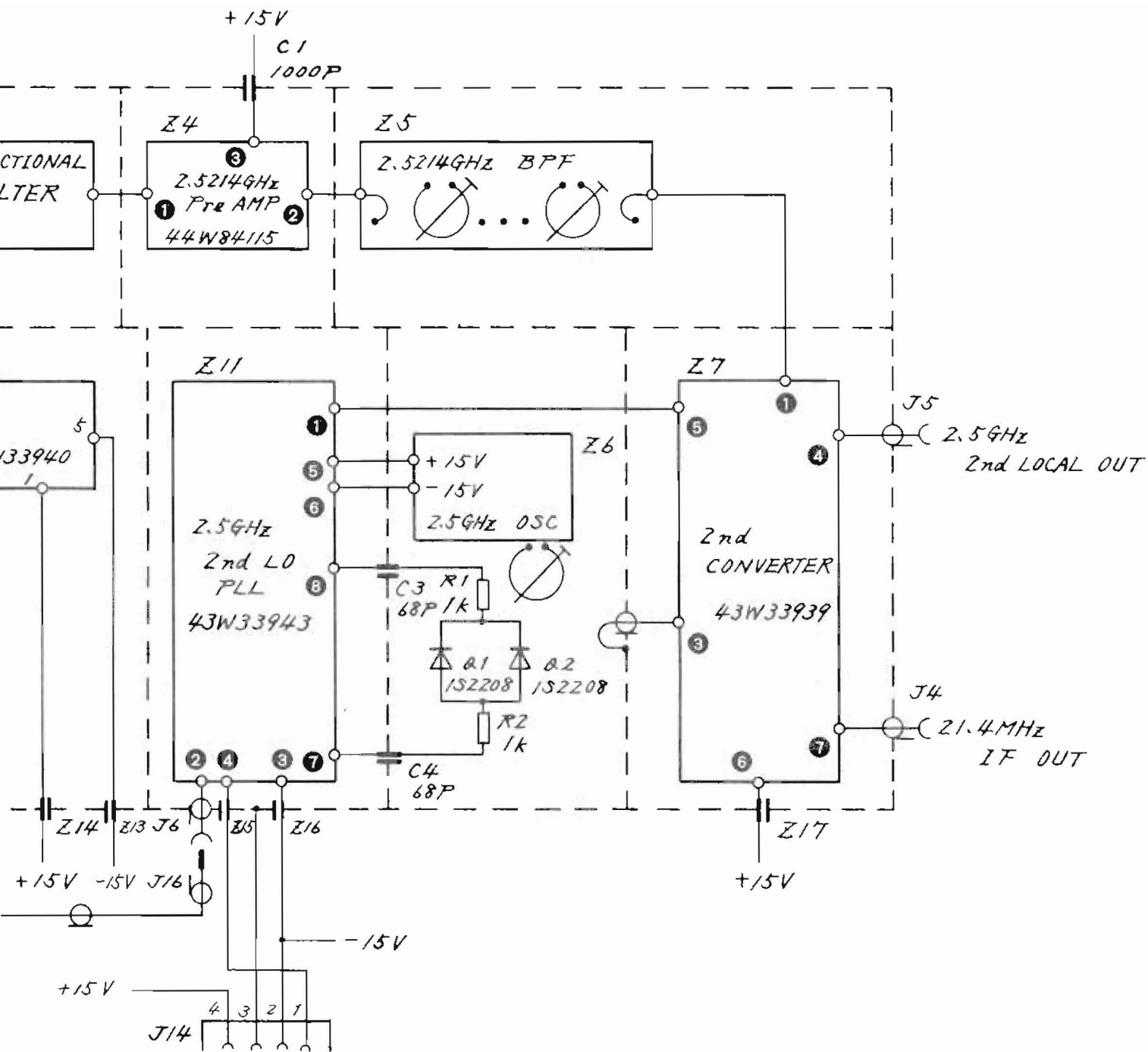
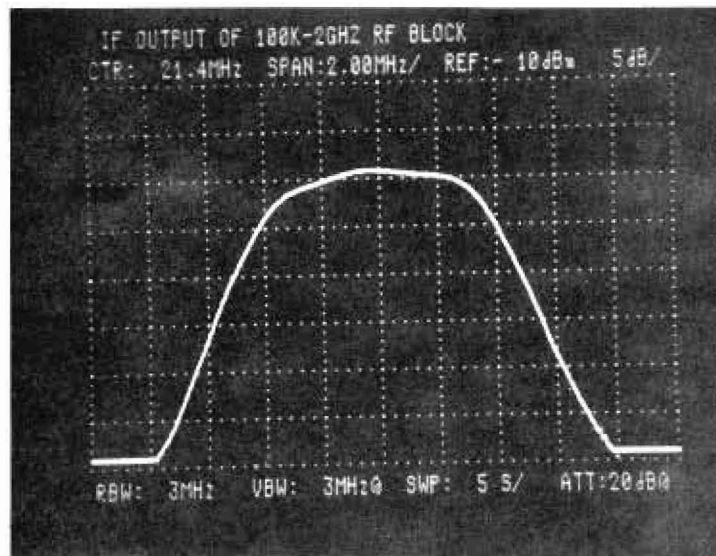
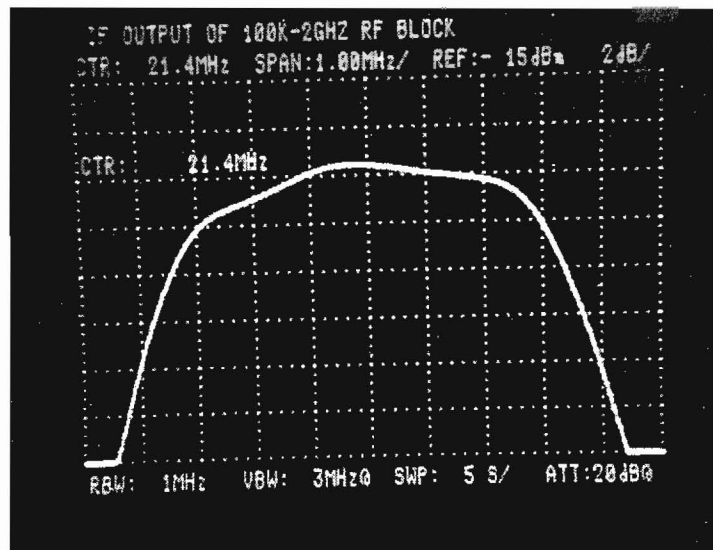


Fig. 5-19 Z14 0 to 2 GHz RF  
BLOCK Circuit Diagram  
(43W33938)

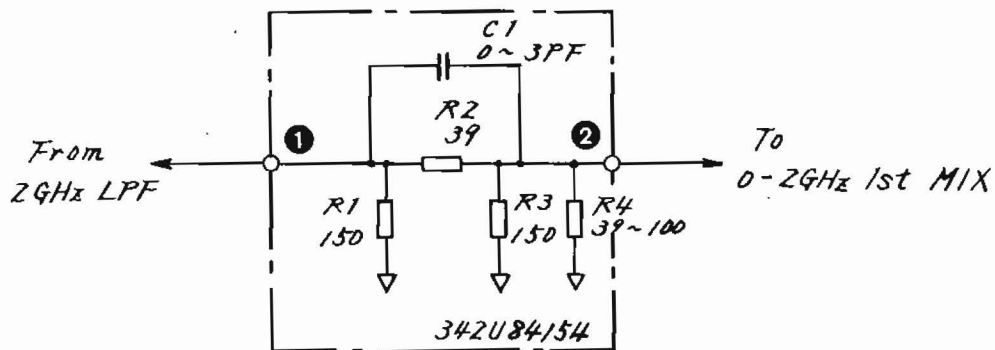
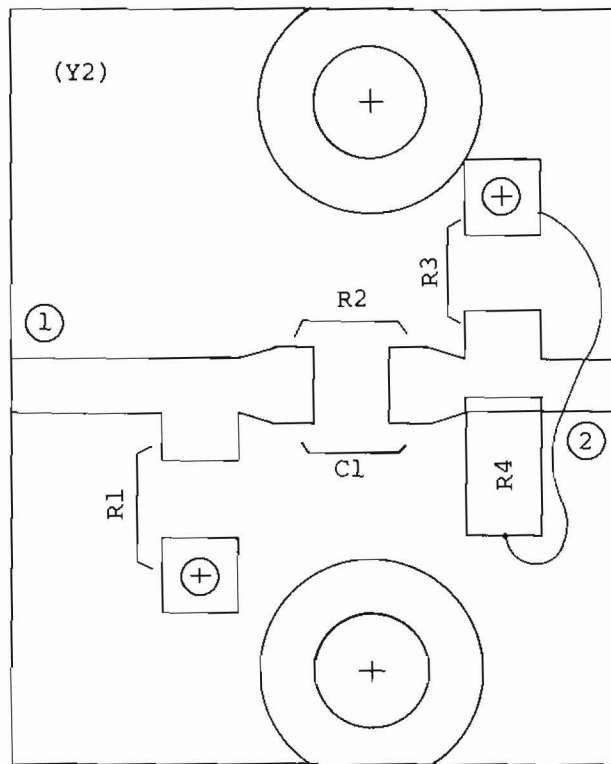


(1) SPAN 2 MHz/div,  
5 dB/div



(2) SPAN 1 MHz/div,  
2 dB/div

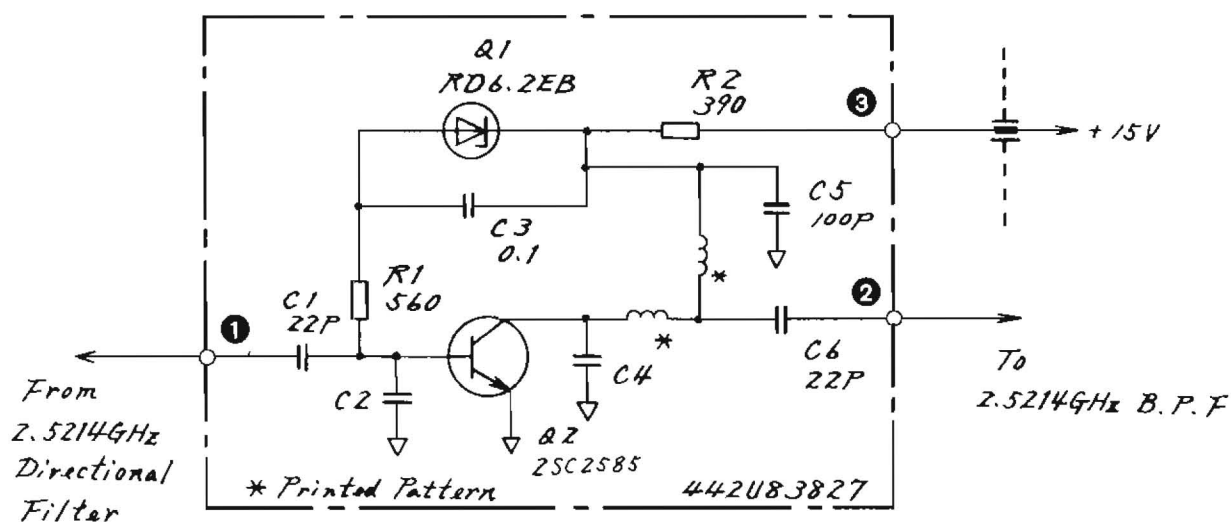
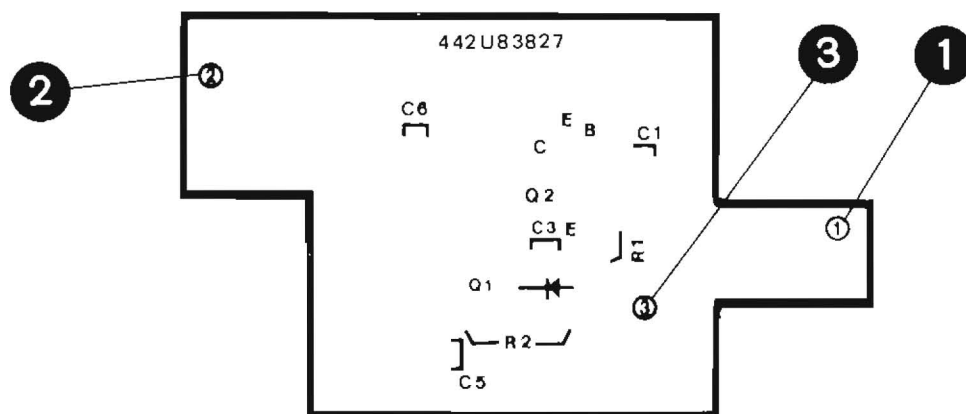
Fig. 5-20. Z14-Z5 2.5214 GHz BPF Adjustment



PC Board : 44ZU83825

Parts List : 44W83929

Fig. 5-21 Z14-Z1 1st MIX PAD Circuit Diagram and Parts Layout  
(44W84113)



PC Board : 442U83827.  
Parts List: 44W83931

Fig. 5-22 Z14-Z4 2.5214 GHz PRE AMP Circuit Diagram and  
Parts Layout (44W84115)

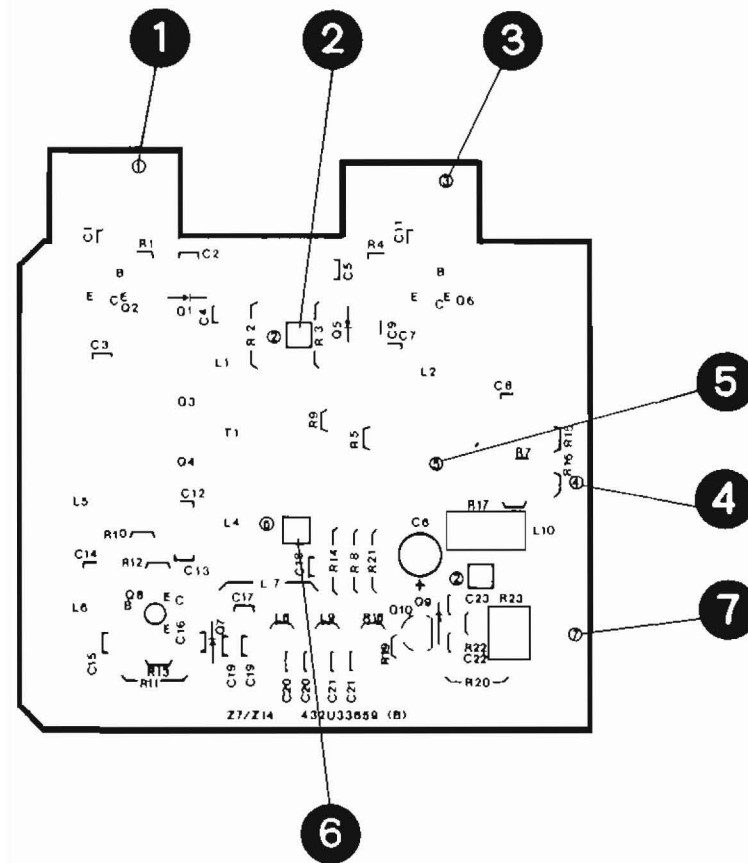
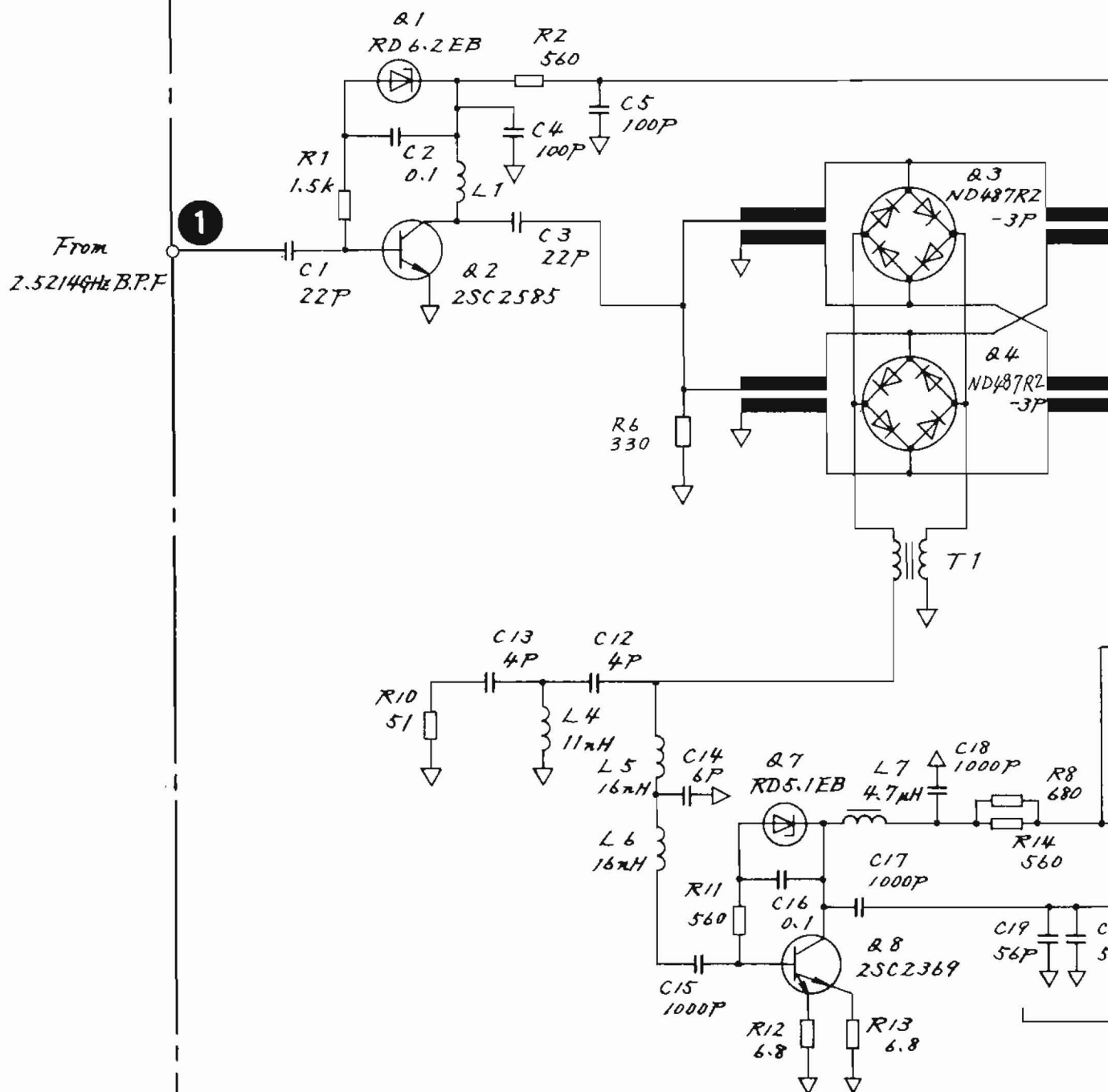
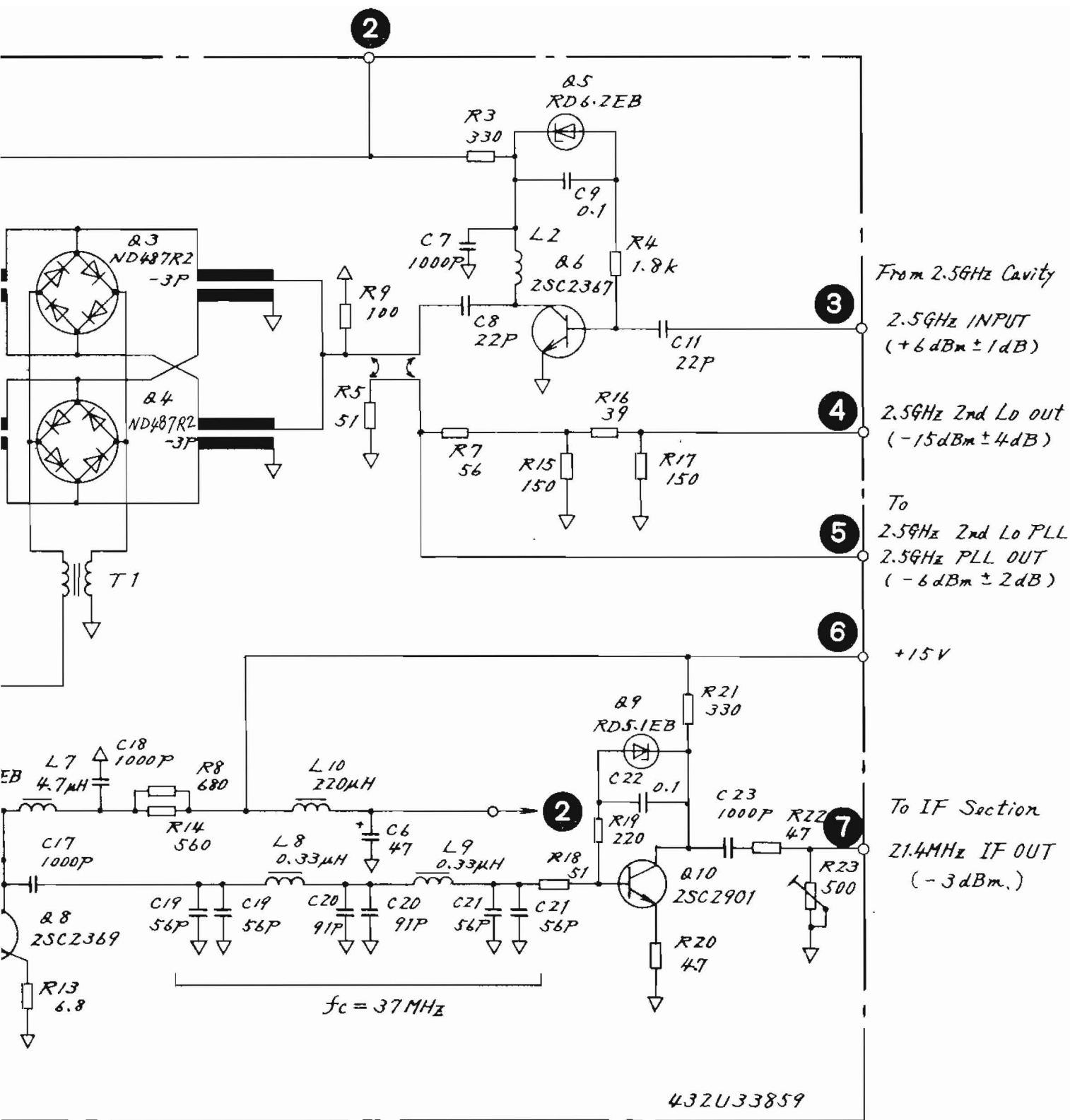


Fig. 5-23 Z14-Z7 Parts Layout





PC Board ; 432U33859  
Parts List : 44W83932

Fig. 5-24 Z14-Z27 2nd  
CONVERTER Circuit Diagram  
(43W33939)



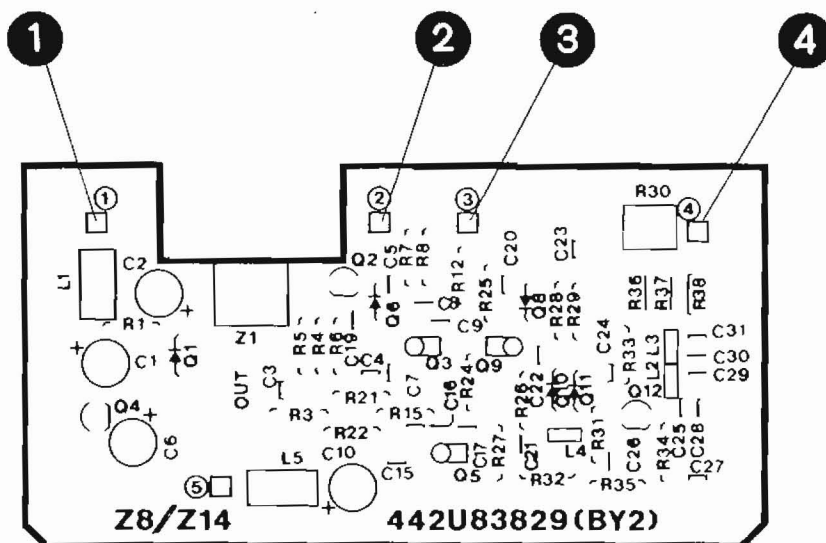
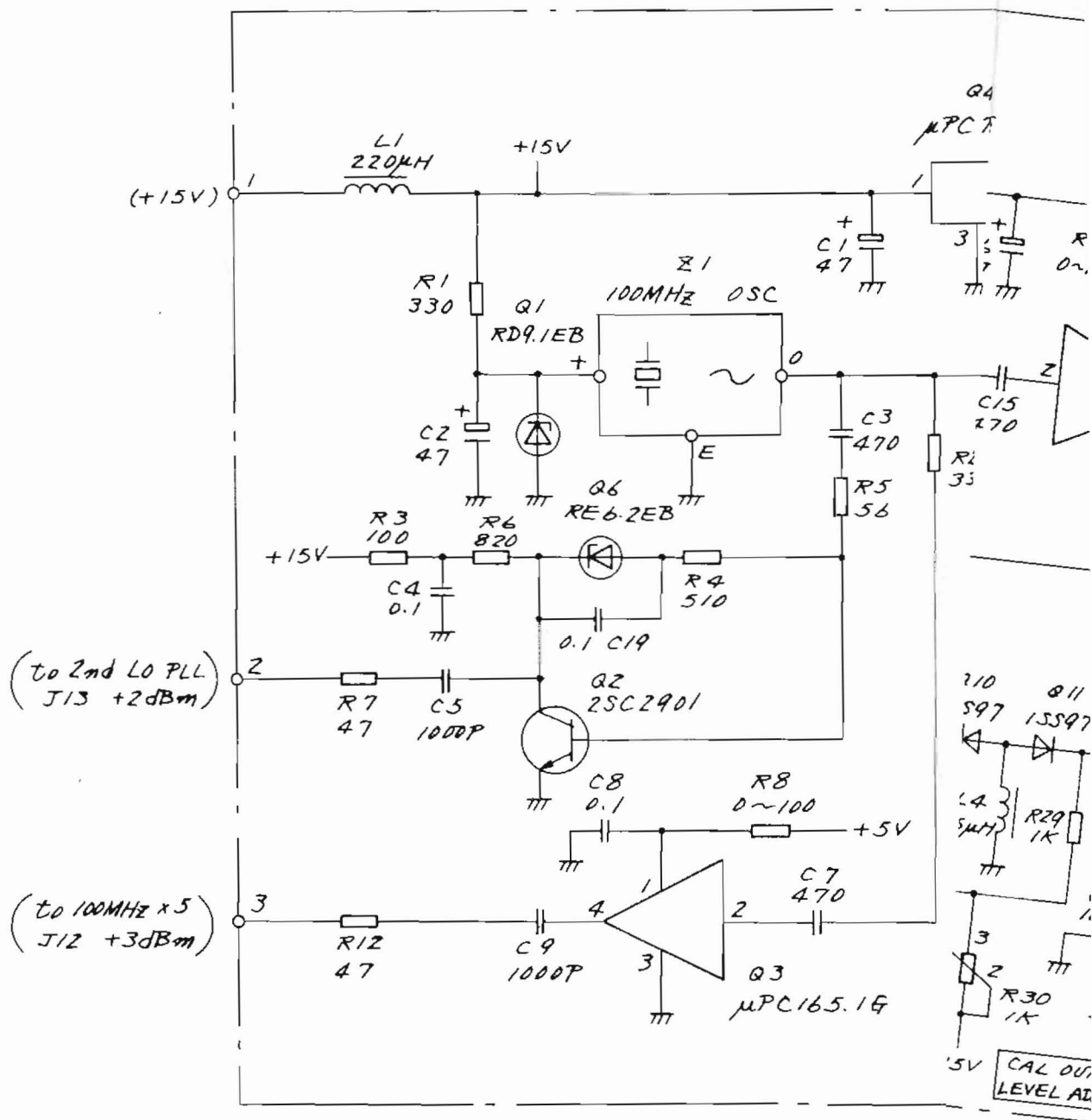
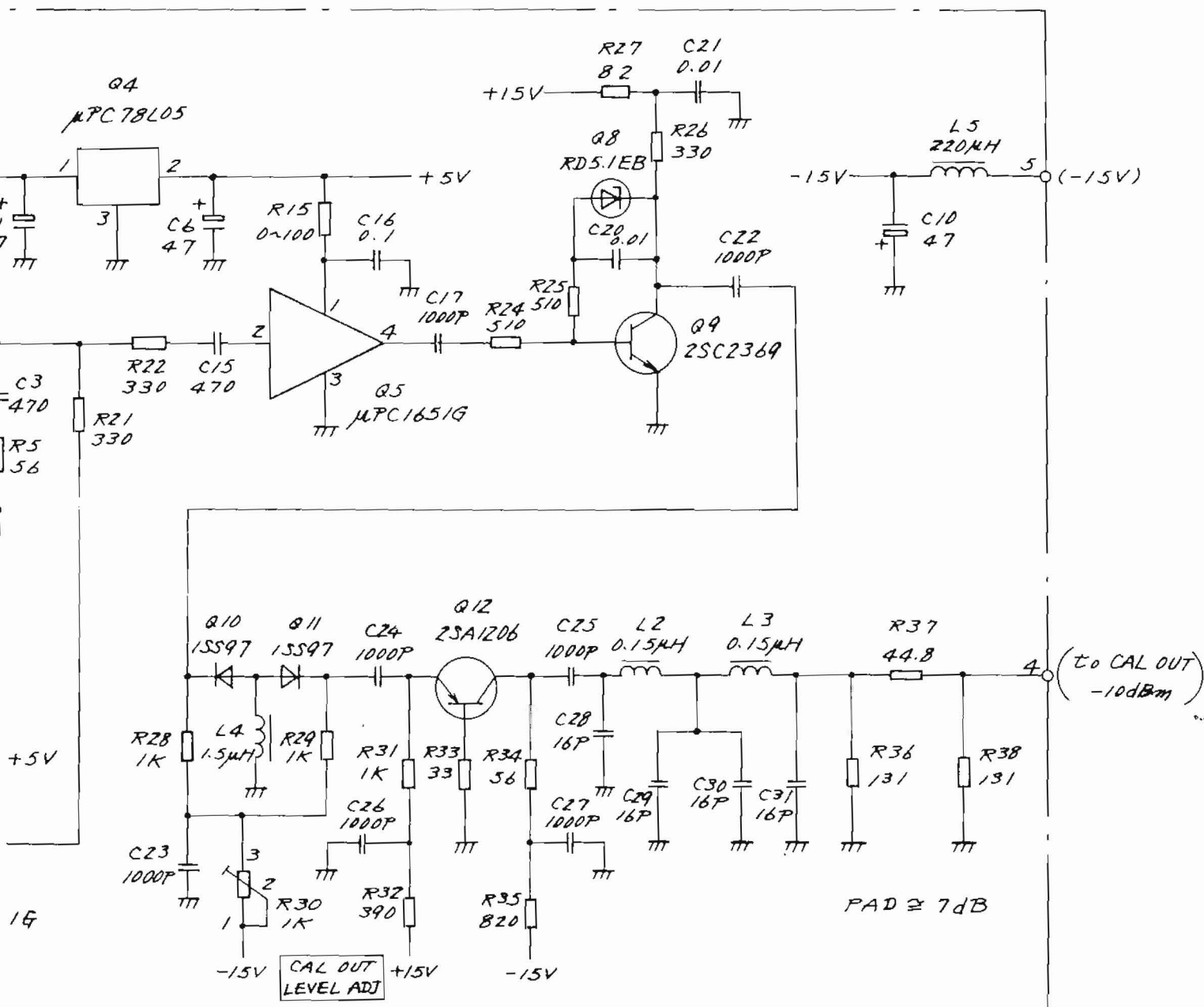


Fig. 5-25 Z14-Z8 Parts Layout

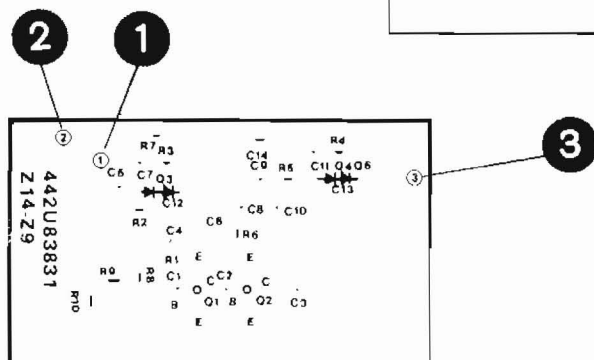
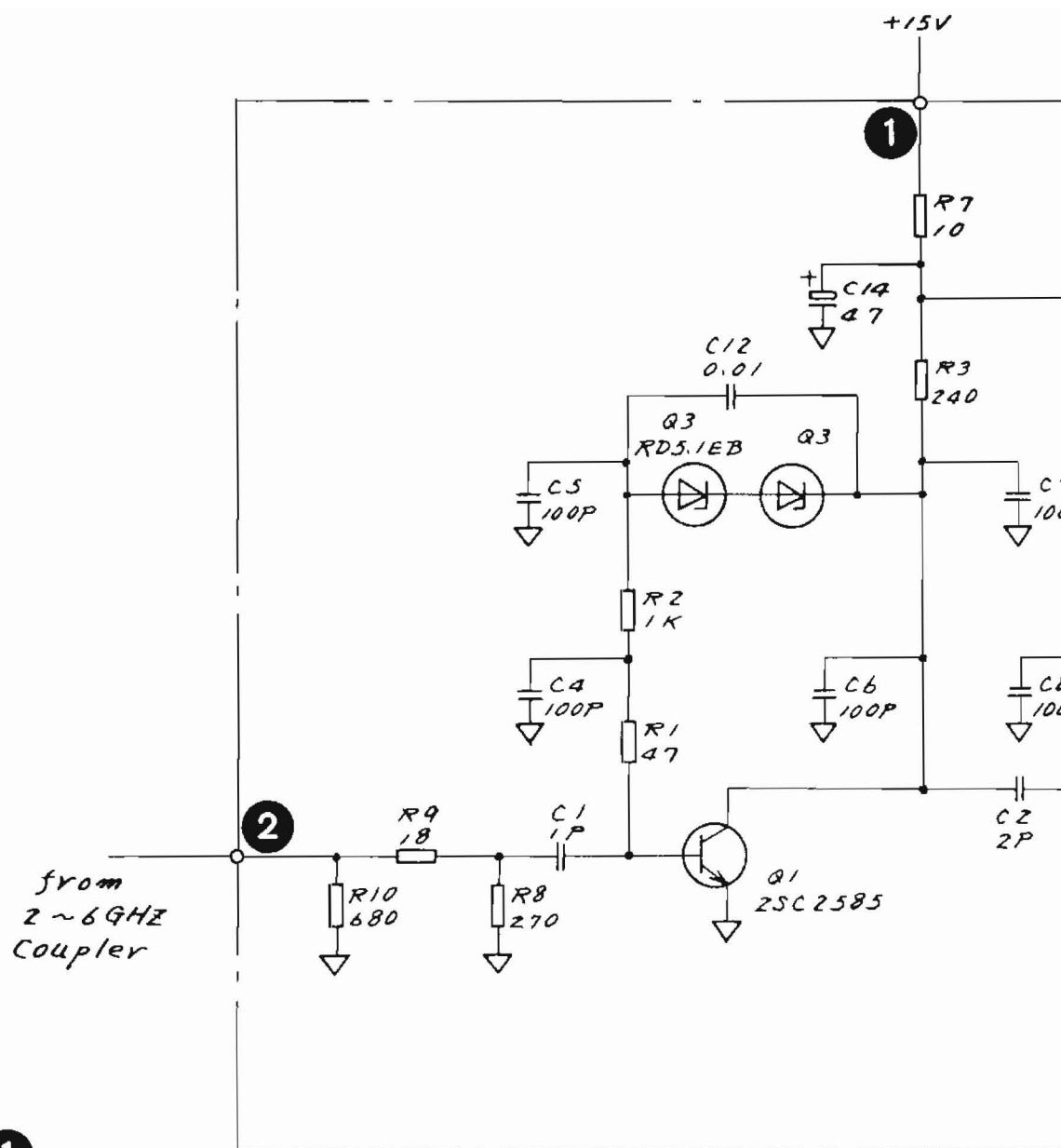


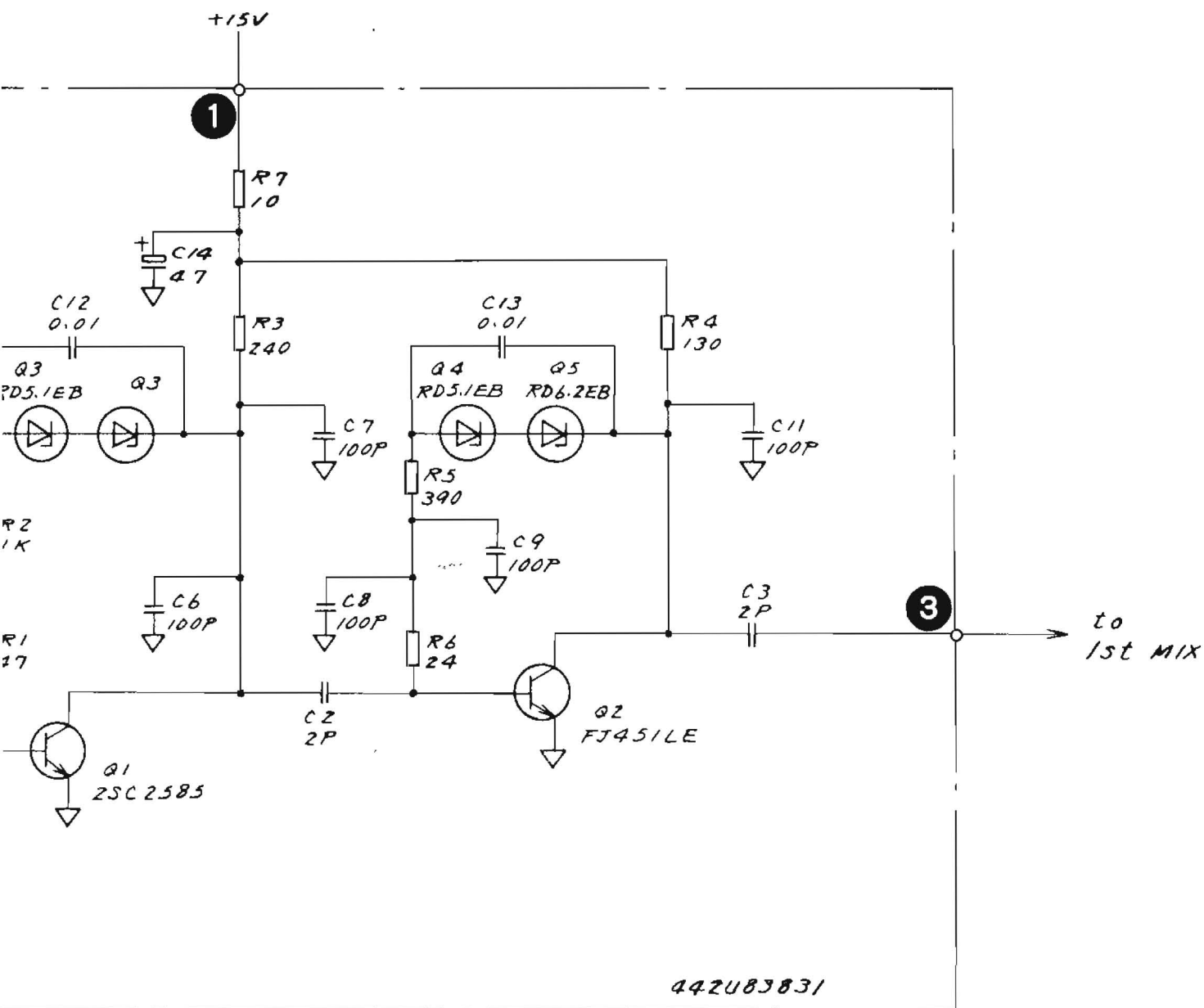


PC Board : 442U83829  
Parts List : 44W83933

Fig. 5-26 Z14-Z8 100 MHz  
REF OSC Circuit Diagram  
(43W33940)

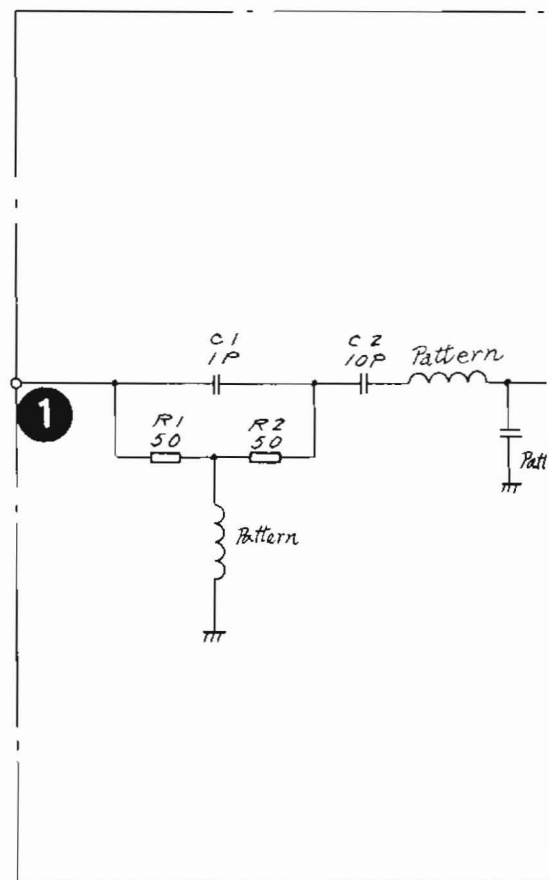


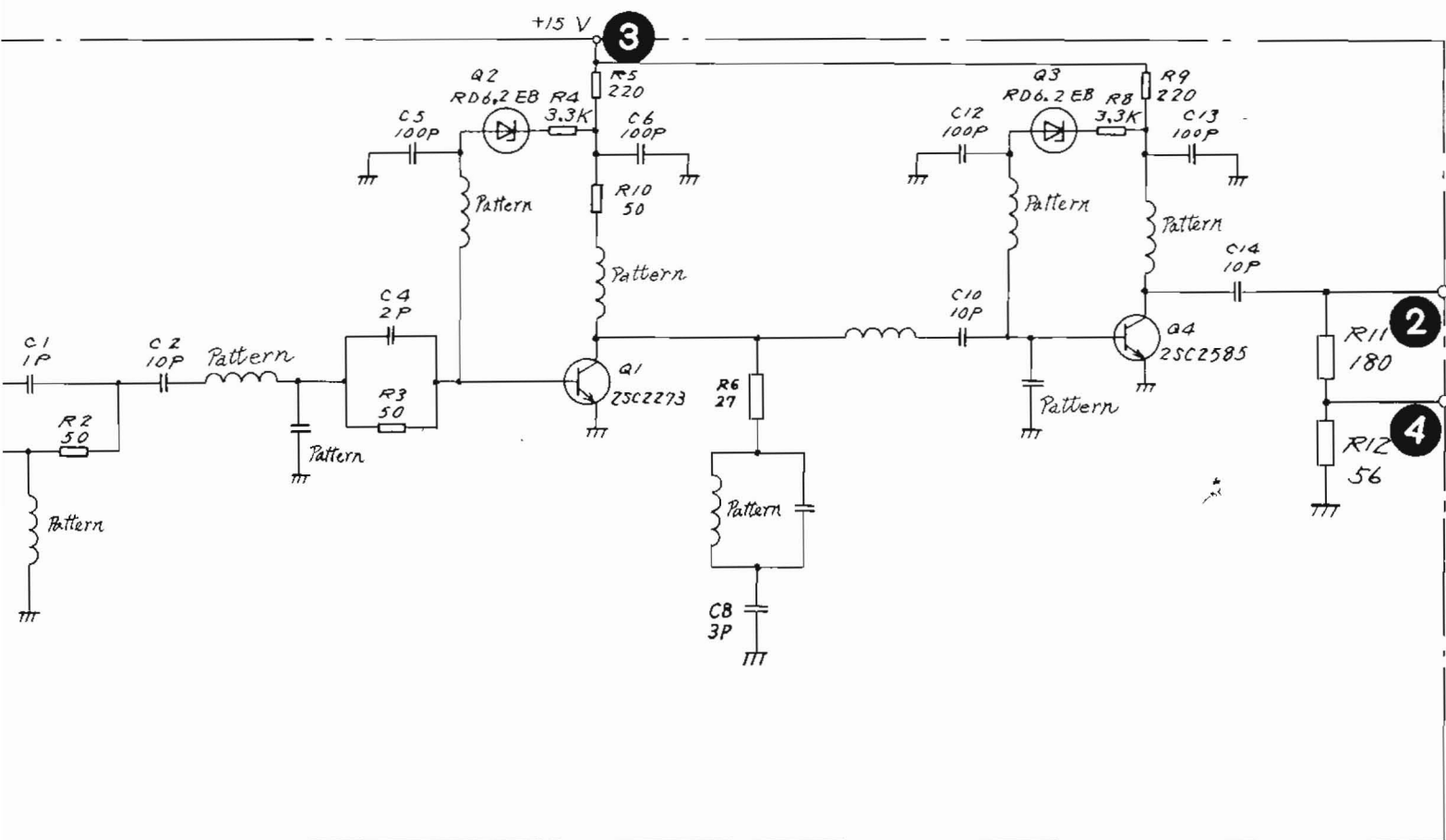
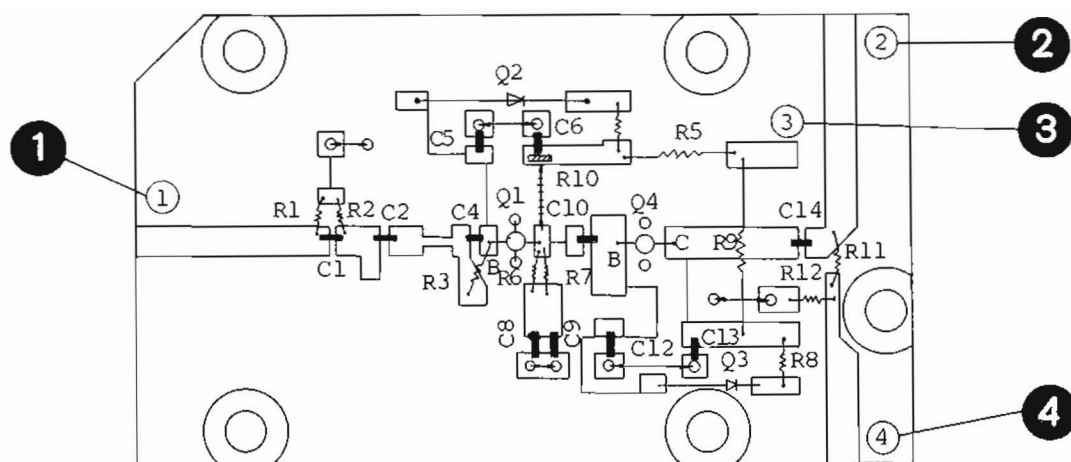




PC Board : 442U83831  
 Parts List : 44W83934

Fig. 5-27 Z14-Z9 2.5 - 4.5  
 GHz LO AMP Circuit Diagram  
 and Parts Layout (43W33941)



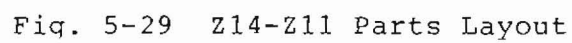


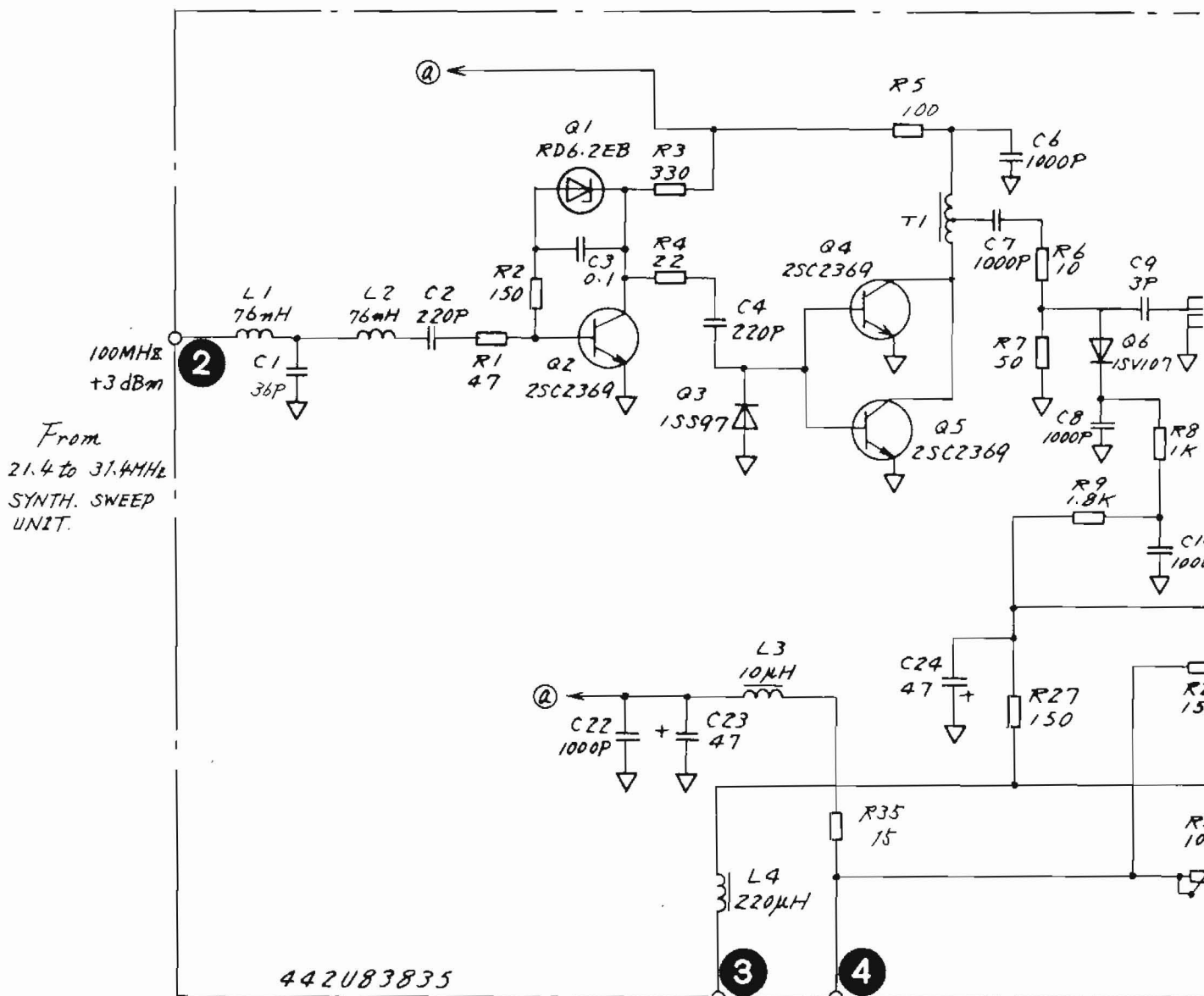
PC Board : 442U 83833

Parts List : 44W83935

Fig. 5-28 Z14-Z10 2 to 6 GHz  
CPL AMP Circuit  
Diagram and Parts  
Layout (44W 33942 M-1)







R14: Sampler balance adjust  
R19: PLL LOOP gain adjust  
R29: Collector voltage adjust

From 2nd Converter

2.5GHz INPUT  
-8 dBm

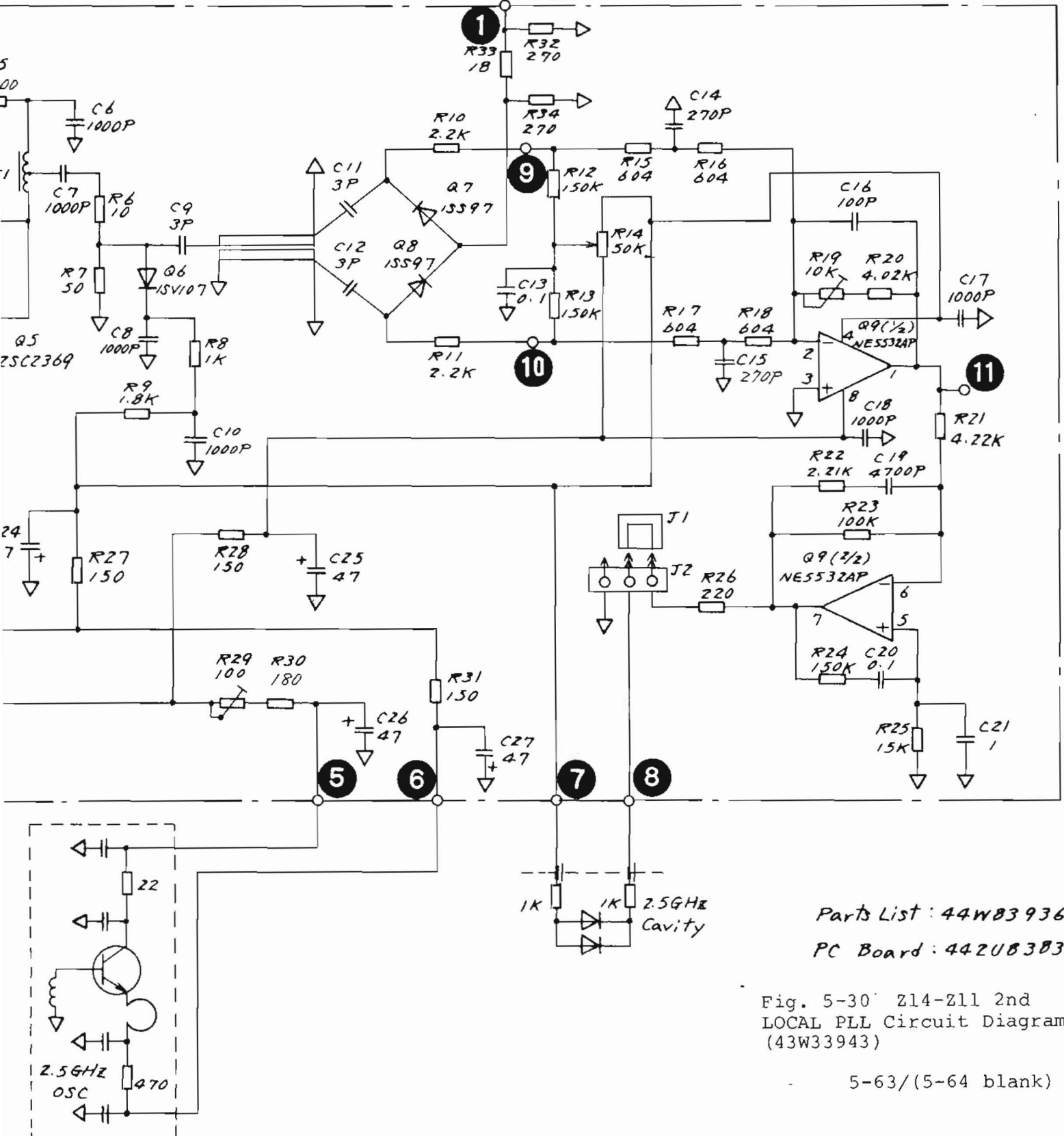


Fig. 5-30 Z14-Z11 2nd  
LOCAL PLL Circuit Diagram  
(43W33943)

5-63/(5-64 blank)

## 5.7 Z16 PLL Block

### 5.7.1 Circuit Description - Z16

(Refer to Fig. 3-3 (4/4), Figs. 5-31 to 5-46)

This block contains the main part of the phase lock loop (PLL) circuit that maintains the accuracy of the MS710[ ] first local frequency.

Because comprehensive explanations of the configuration and operation are given in Section 3, only the Z16 PLL block is explained here.

A part of the first local signal distributed by the Z7 coupler (Paragraph 5.5) is sent from Z16-J1 to the Z16-Z3 sampler RF input through the Z16-Z11 HPF.

The signals with a precisely determined frequency that are generated in Q1 of the Z16-Z6 M/N VCO are passed through the Q10 of Z16-Z6 buffer amplifier and are sent to the Z16-Z5 pulse amplifier circuit.

The signal frequency is divided to one-eighth by Q3 of Z16-Z5; it is then amplified by Q6, Q8, and Q9 of Z16-Z5. Then, the signal is sent to the Z16-Z2 sampler driver circuit.

The Z16-Z2 sampler driver circuit generates a number of high-order harmonics of input signals by using the Q1 step recovery diode, and then outputs them to the Z16-Z3 sampler.

In this way, the Z16-Z3 sampler performs a kind of mixing of the high-order harmonics of a one-eighth frequency divided signal from the Z16-Z6 M/N VCO with the output signal from the Z7 coupler. The Z16-Z3 sampler generates a number of IF signal components.

IF signal components in the 17.4 MHz range are selectively amplified by the Z16-Z1 YTO PLL preamplifier and are sent to the Z16-Z9 YTO PD circuit through the Z29 low local 2.

The Z16-Z9 YTO PD circuit removes high-frequency components by using an LC LPF. In this way a selected component is amplified by Q2, Q4, and Q6 of Z16-Z9 and is converted by the Q8 limiter circuit into a signal with an amplitude of the ECL level. Then this signal is sent to the Q14 phase detector.

The 17.4  $\pm$ 2 MHz reference signal generated by the Z21 local control 1 circuit is also input to the Q14 of Z16-Z9 circuit and the phase difference between these signals is detected. These phase differences are converted by the Q14 circuit into the error voltage signal and are sent to the YTO PLL LF circuit in Z16-Z10 after being amplified by Q15 of Z16-Z9.

The Z16-Z10 YTO PLL LF circuits are the active two-stage LPF circuits used as the loop filter which comprises Q29 as the main part in Z16-Z10. The error signal passing through the loop filter, the Q15 analog switch, and the Q30 of Z16-Z10 sample-hold circuit, is sent to the Z10 YTO/YTF driver as the PLL signal. Q30 holds the error voltage signals when the PLL operates at the center frequency for wideband sweeps during the sweep resetting. The Q15 analog Sw. is used to improve the PLL response when Q30 samples error voltage signals during sweep resetting.

Z16-Z7, Z16-Z8 and parts of the Z16-Z10 form a sub-PLL circuit used to accurately determine the Z16-Z6 M/N VCO frequency. The Z16-Z6 M/N VCO output is isolated by Q6 of Z16-Z6 and is sent to the Z16-Z7 M/N mixer circuit.

The Z16-Z7 mixes the 1000 MHz signal generated by the Z16-Z8 5 x 100 MHz circuit and a doubler in the Z16-Z7 with the Z16-Z6 M/N VCO output using Z1 mixer in Z16-Z7. The frequency difference component signal from Z1 is sent to the Z16-Z10 M/N PD circuit through the Q7 and Q9 amplification circuits of Z16-Z7.

The Z16-Z10 M/N PD circuit performs a one-Mth-frequency division of this signal from Z16-Z7 by using the Q1, Q4, Q5, and Q6 programmable frequency divider circuits of Z16-Z10, and compares the phases of this signal with the 16/N MHz (340.4 to 1000 kHz) signal sent from the Z26 CPU board at Q8. The Q7 of Z16-Z10 converts the difference phase into voltage signal and this signal is amplified by Q20 and Q17. Then this signal is sent to Q2 of Z16-Z6 M/N VCO in order to control M/N VCO oscillation frequency.

In this way, the M/N VCO oscillation frequency is accurately controlled at the value expressed in the following formula.

$$f_{M/N \text{ VCO}} = 1000 + 16 \times \frac{M}{N}$$

The values of  $f_{M/N \text{ VCO}}$ ,  $M$ , and  $N$  actually used are listed in Tables 4-1 (1/2) and (2/2).

### 5.7.2 Checking procedure - Z16

After resetting the MS710C, set the center frequency to 3 GHz and SPAN to 0 MHz. In this case, the following is obtained during normal operation. (Refer to Fig. 3-4.)

$$F_{LO}(f_{YT0}) = 3521.4 \text{ MHz}$$

where, numbers  $N$  and  $M$  are  $N=27$  and  $M=64$ , and  $f_{M/N \text{ VCO}}$  is set to 1037.92 MHz.

(1) Checking the main PLL

If 129.740 MHz is not obtained at terminal ④ of Z16-Z6, first check the sub PLL, as described in (2).

(a) Z16-Z5 pulse AMP

The input level is set to -10 dBm and the output level is set to +22 dBm.

The AMP is normal if about 6 Vp-p sine waves are observed when monitoring terminal ④ with the oscilloscope.

(b) Z16-Z2 Sampler Driver, Z16-Z3 Sampler, and Z16-Z1 YTO PLL PRE AMP

The 3521.4 MHz, -2 dBm signal from Z16-J1 is converted into a 18.4 MHz signal by using the signal of a 129.740 MHz frequency from the Z16-Z5 pulse amplifier.

The level is approximately -30 dBm at terminal ⑤ for Z16-Z1 YTO PLL PRE AMP output.

The relational expression of the frequency conversion is obtained as  $3521.4 - (129.740 \times 27) = 18.4$  (MHz).

(c) Z16-Z9 YTO PD

If the signal at ⑧ has 1 Vp-p amplitude with +4 Vdc, Q2 through Q8 are normal. (To prevent any malfunctions due to noise, an offset bias voltage is applied.)

The signal at ③ is normal for 17.4 MHz and approximately 800 mVp-p. If abnormal, check the Z21 local control 1 circuit.

When a main PLL is set normally, the voltage of terminal ④ becomes set to 0 V. When unlock becomes set, it becomes set to +2 V or -2 V.

(d) Z16-Z10 M/N PD - YTO PLL LF (2/2)

When the main PLL operates normally, both terminal ⑩ and ⑪ are set to 0 V.

In an unlock, ⑪ is set to +0.7 V or -0.7 V, and ⑫ is set to -4 V or +4 V.

(2) Checking the Sub PLL

(a) Z16-Z8 5 x 100 MHz

In normal operation ① is 100 MHz, -4 dBm ② is 500 MHz, +13 dBm and ③ is 1000 MHz, -5 dBm.

(b) Z16-Z7 M/N MIX

In the present settings, the Z16-Z6 fM/N VCO is 1037.92 MHz, so the frequency of ④ of Z16-Z7 is 37.92 MHz.

The normal level of ④ is 400 mVp-p to 800 mVp-p.

(c) Z16-Z6 M/N VCO

The tuning voltage is applied to terminal ①. The typical characteristics of the tuning voltage versus the fM/N VCO are shown in Fig. 5-40.

Also, because the aluminium cover of the oscillators (Q1 to 5) forms a part of the resonance circuit, the oscillators do not operate normally if the cover is removed, so the voltage at ① is checked at C10 of Z16 PLL Block.



(d) Z16-Z10 M/N PD - YTO PLL LF (1/2)

This PC board includes both the sub PLL circuit and main PLL circuit, and the part shown in Fig. 5-46 (1/2) is the sub PLL circuit.

Check the 16/N (MHz) signals at terminal ③, which are sent from the Z26 CPU board.

Assume that N is 27 and 592.59 kHz is obtained. The signal level is set to the TTL level. (If normal signals are not obtained, check the operation of the Z26 CPU board.) Then, signals at terminal ① must be checked to determine whether they are the same as those at M/N MIX (Z16-Z17) terminal ④, which was checked in Item (b) (37.92 MHz).

The value M used to divide 37.92 MHz is set to 64, 37.92 MHz divided by 64 is 592.5 kHz, and is equal to the frequency of previously checked terminal ③ of Z16-Z10. Then, the output of ⑦ is set to 0 V.

This voltage is set to +7 V or -7 V for an abnormal (unlocked) status.

### 5.7.3 Adjustment - Z16

#### (1) Z16-Z8 5 x 100 MHz Adjustment

##### (a) Z1, Z2 of Z16-Z8 500 MHz BPF Adjustment

Adjust the trimmer capacitor so that the maximum level can be obtained at terminal ②.

After adjusting the trimmer, confirm that the level is at  $\geq +13$  dBm.

##### (b) Z3 of Z16-Z8 Adjustment

Connect an oscilloscope to terminal ④ of the Z16-Z7 M/N MIXER PC Board.

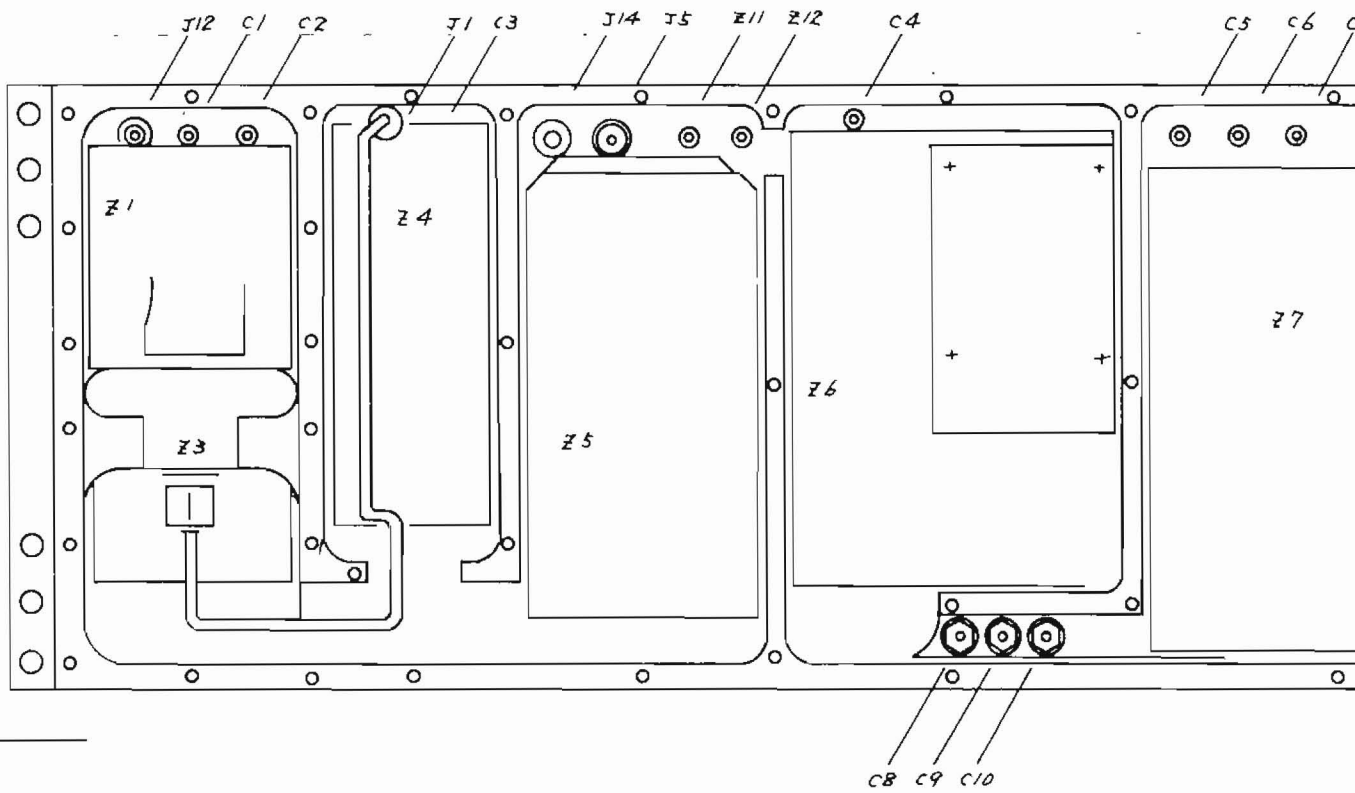
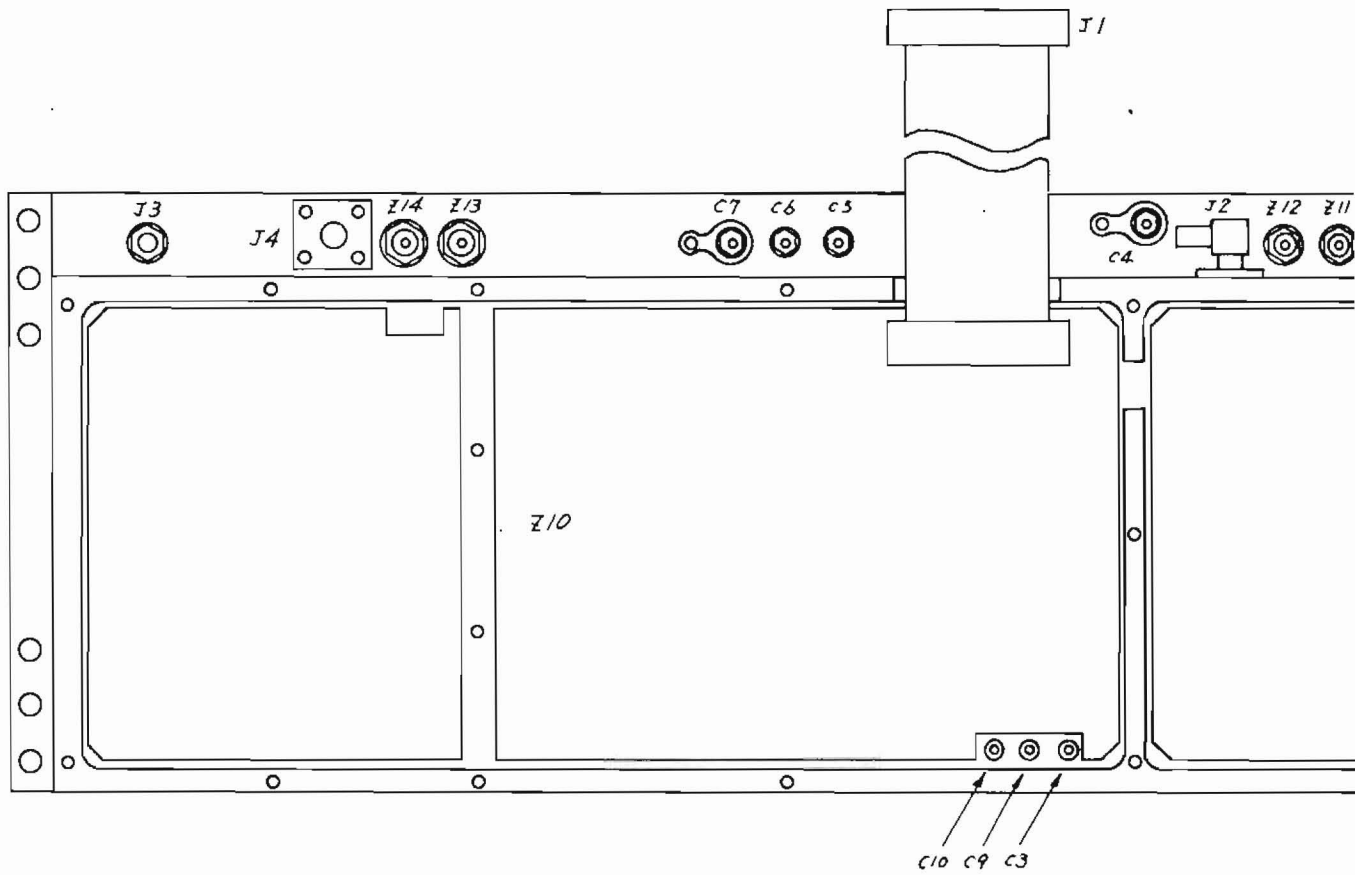
Adjust so as to obtain maximum voltage amplitude while observing the oscilloscope.

#### (2) Z16-Z10 (1/2) M/N PD-YTO PLL LF Adjustment

Tracking on M/N VCO tuning signal:

Adjust R42, R43 to get the minimum PLL control voltage ( $\leq \pm 2$  V) at terminal ⑪ in the following locked condition.

Adj. Position	CTR (1.7 to 23 GHz BAND)	SPAN	M/N VCO	(M/N VCO) / 8
R42	5472 MHz	0	1017.021 MHz	127.127 MHz
R43	1720 MHz	0	1112.00 MHz	139.00 MHz



FRONT SIDE ←

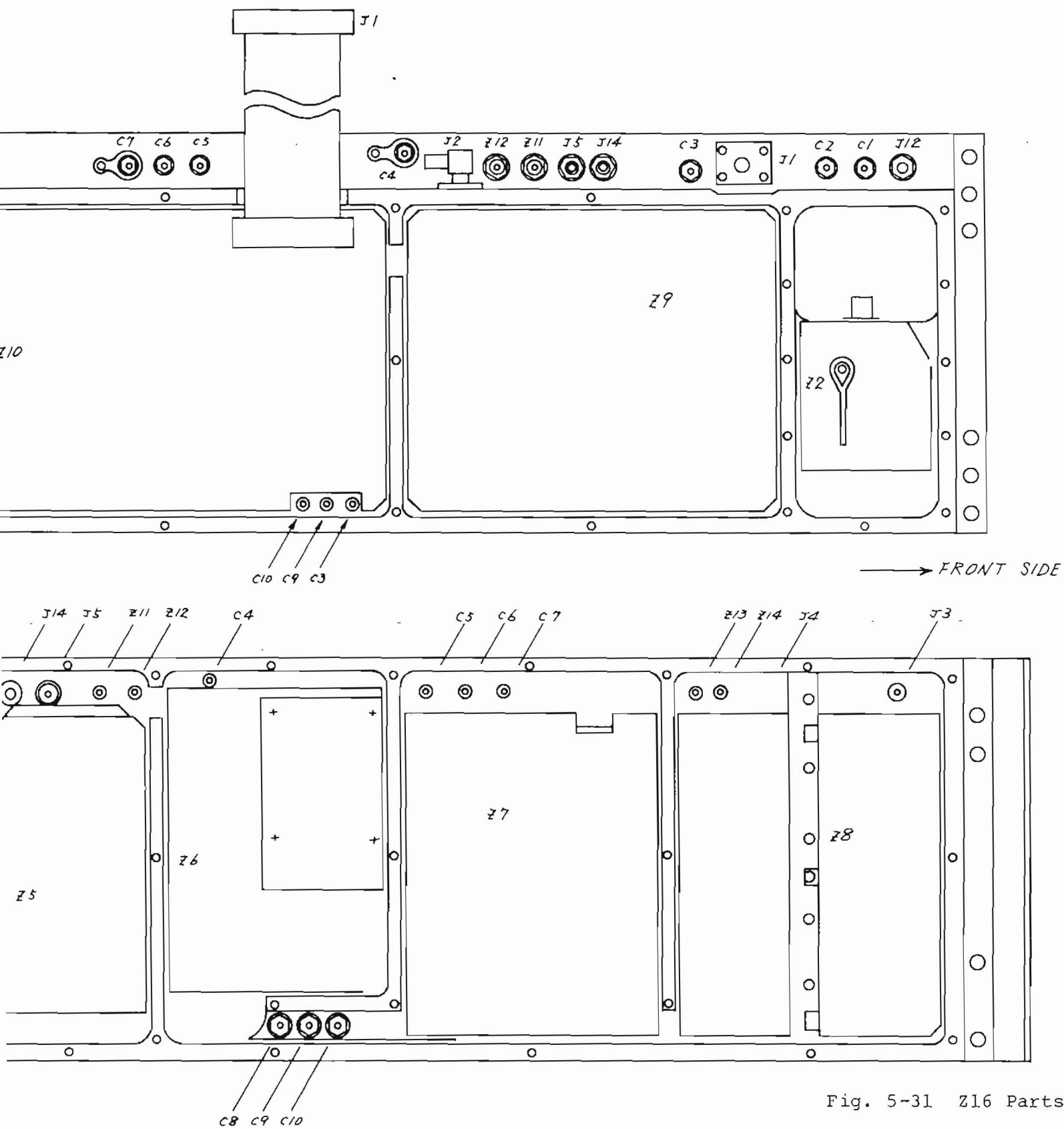
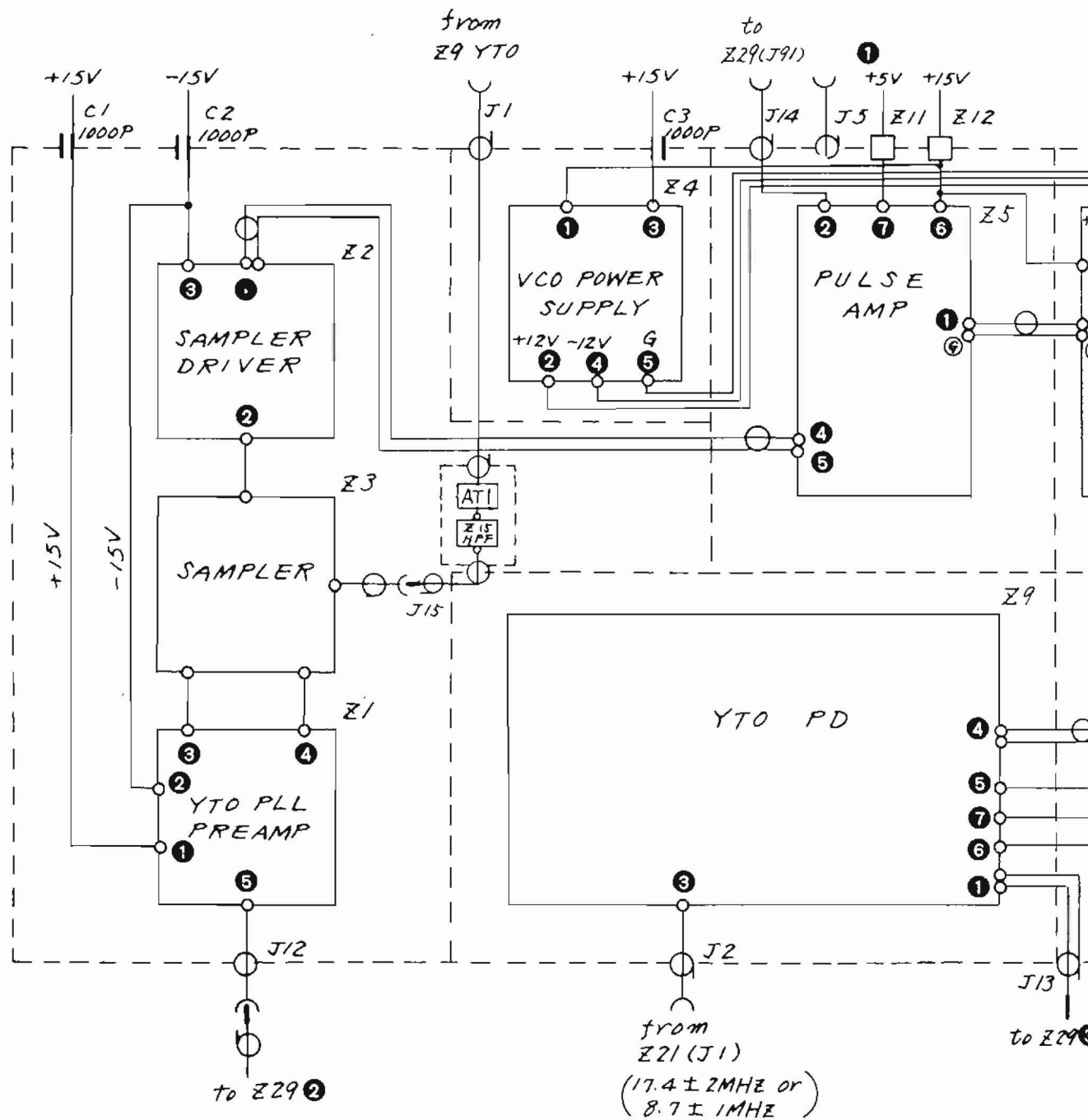


Fig. 5-31 Z16 Parts I



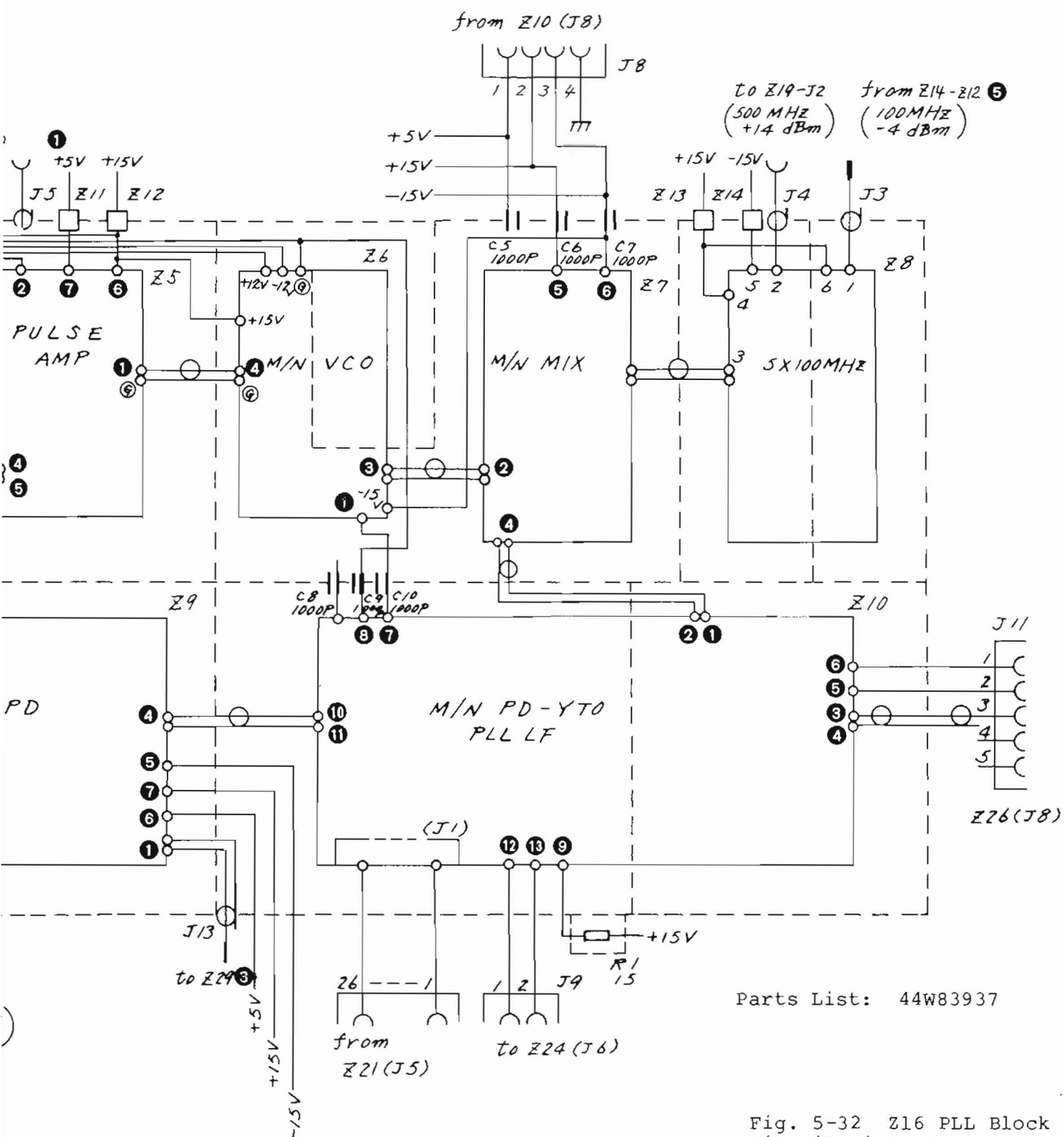
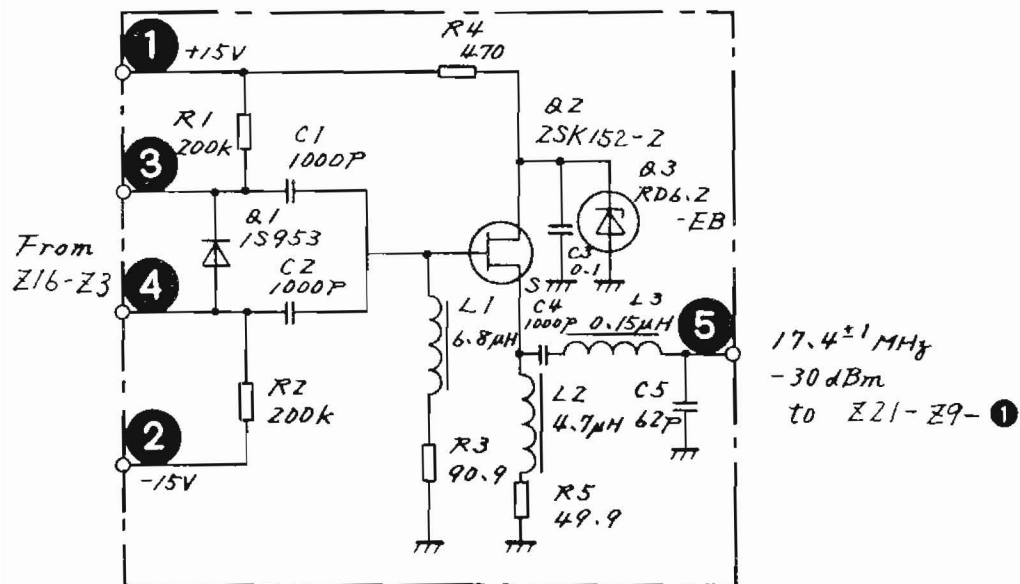


Fig. 5-32 Z16 PLL Block  
Circuit Diagram  
(43W33944)



Parts List: 44W83938  
PC board: 342U82181

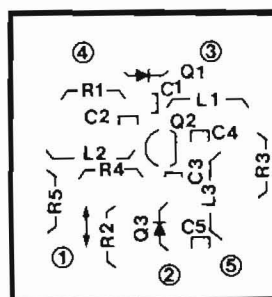
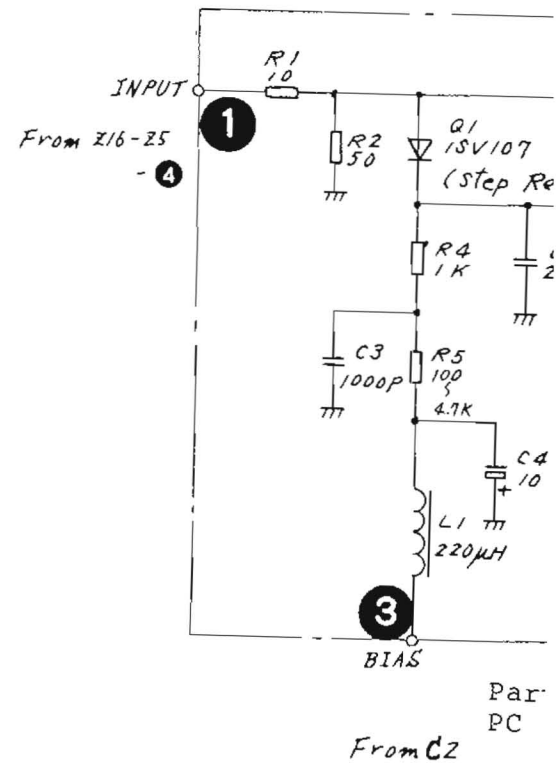
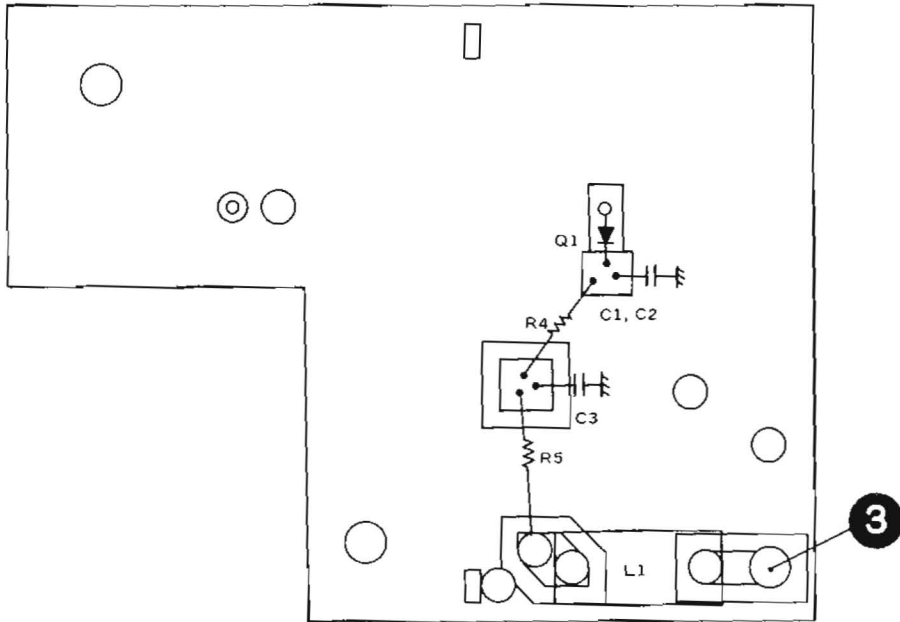
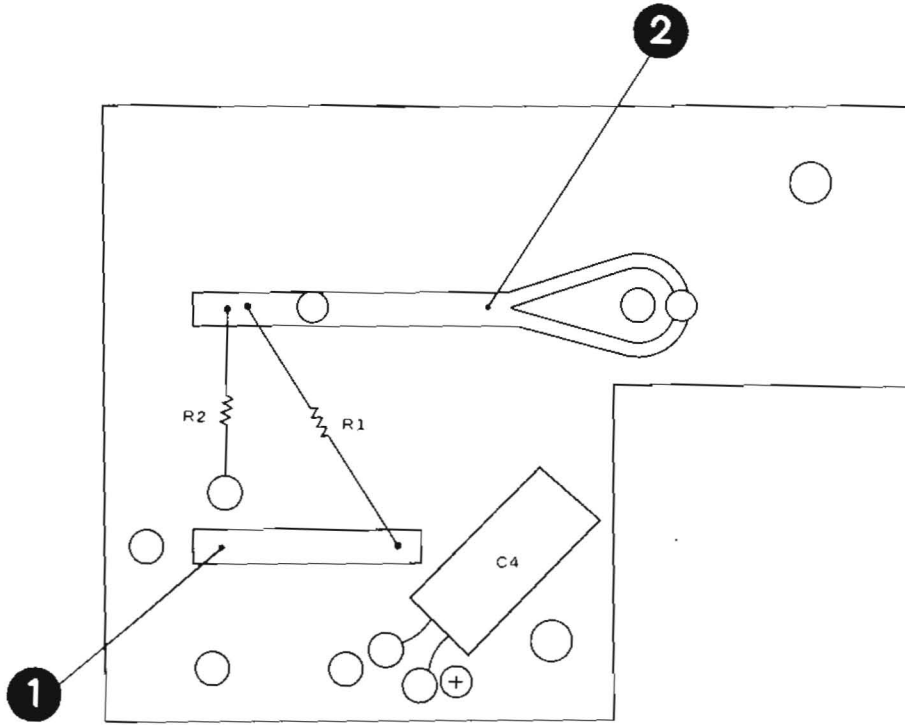


Fig. 5-33 Z16-Z1 YTO PLL PRE AMP  
Circuit Diagram and Parts Layout  
(44W84116)





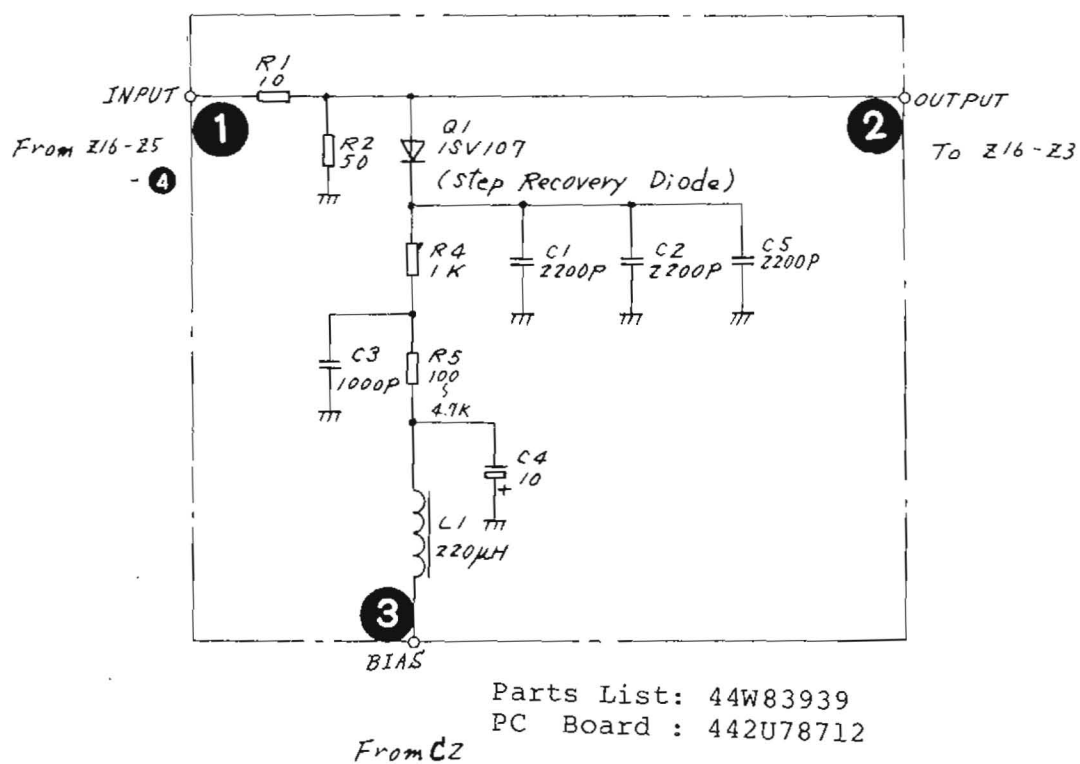
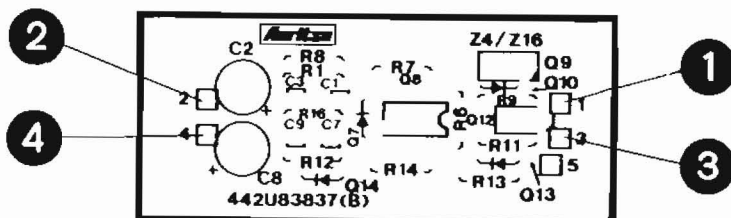
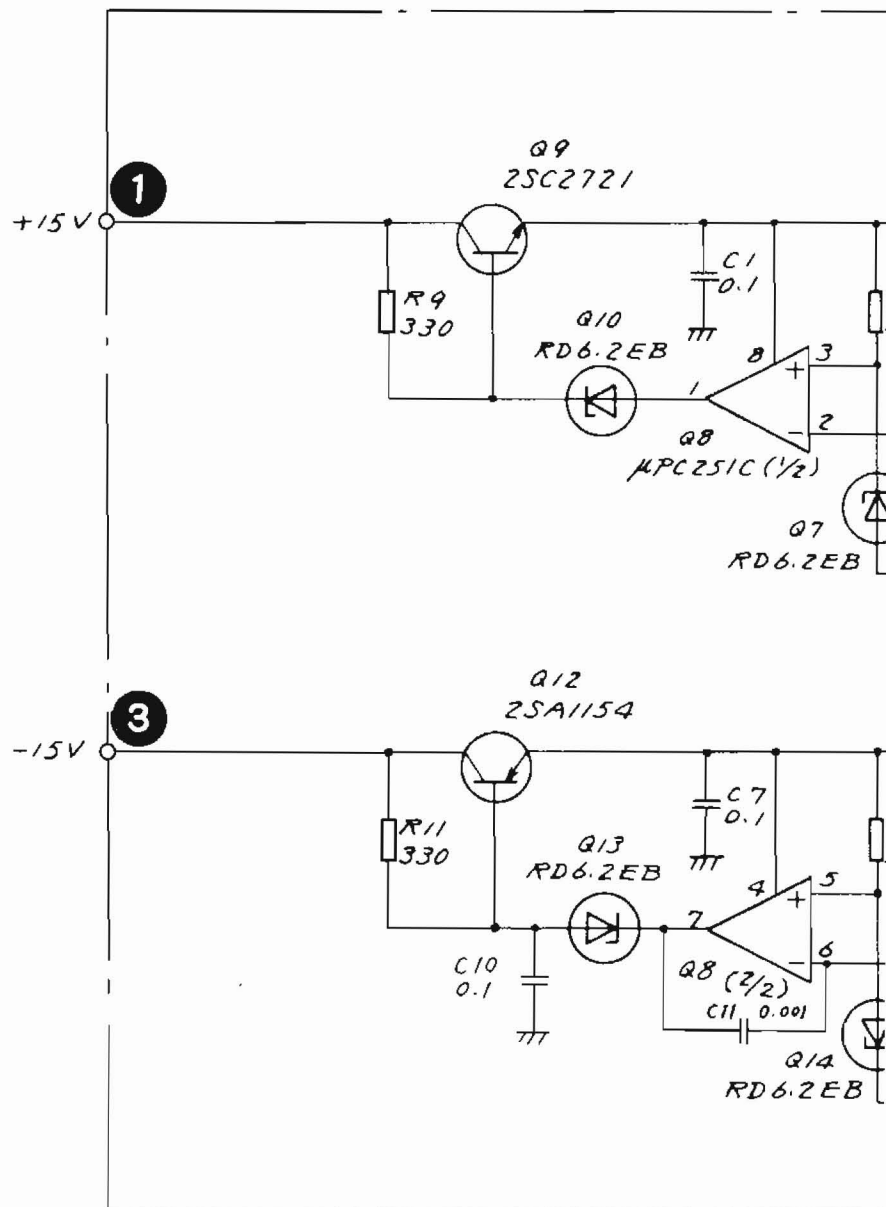
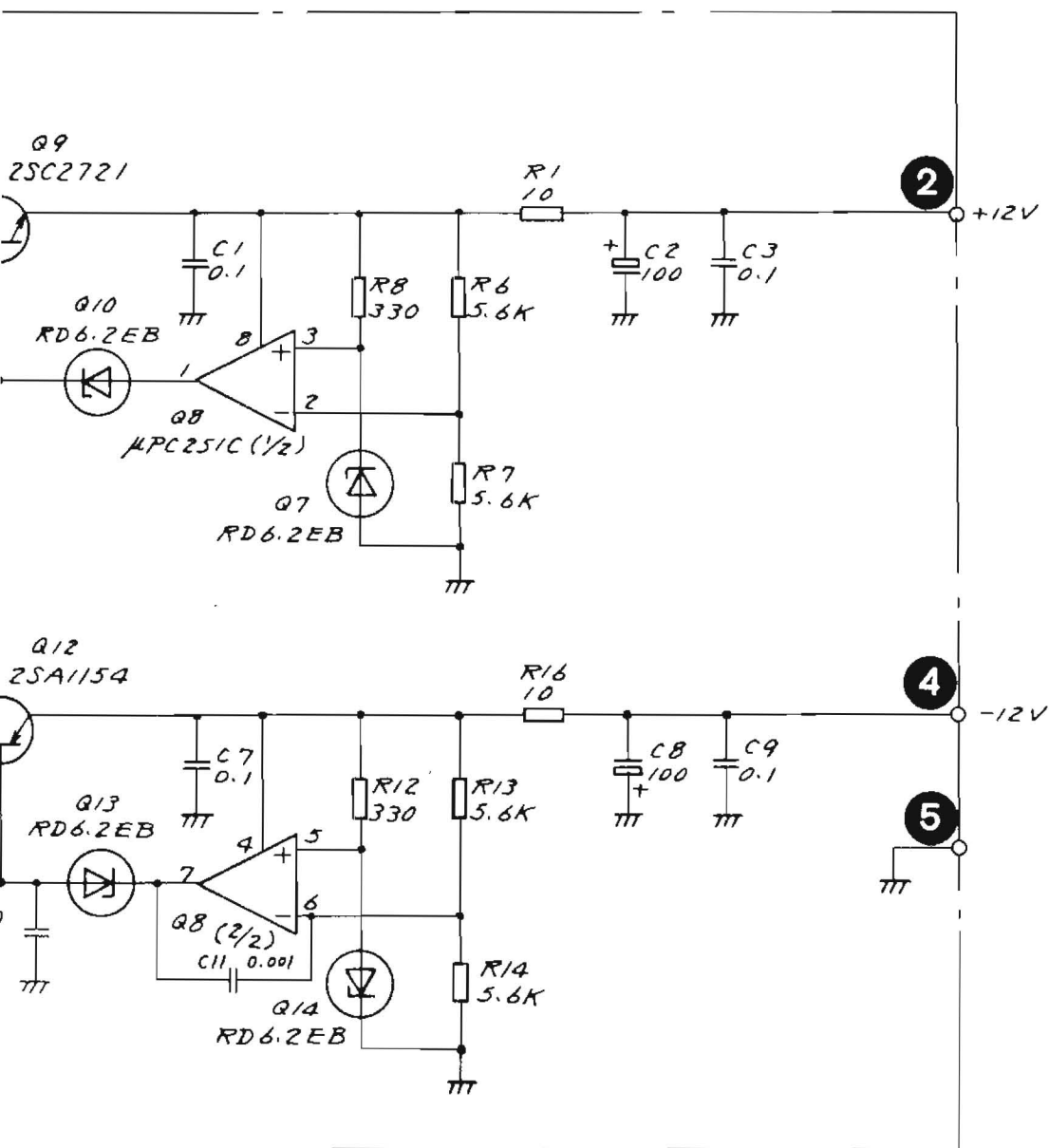


Fig. 5-34 Z16-Z2 SAMPLER  
DRIVER Circuit  
Diagram and  
Parts Layout  
(43W84117)



PC Board : 442U83837  
Parts List: 44W83940



42U83837  
4W83940

Fig. 5-35 Z16-Z4 ISOLATION  
AMP Circuit Diagram and  
Parts Layout (43W33945 M-1)

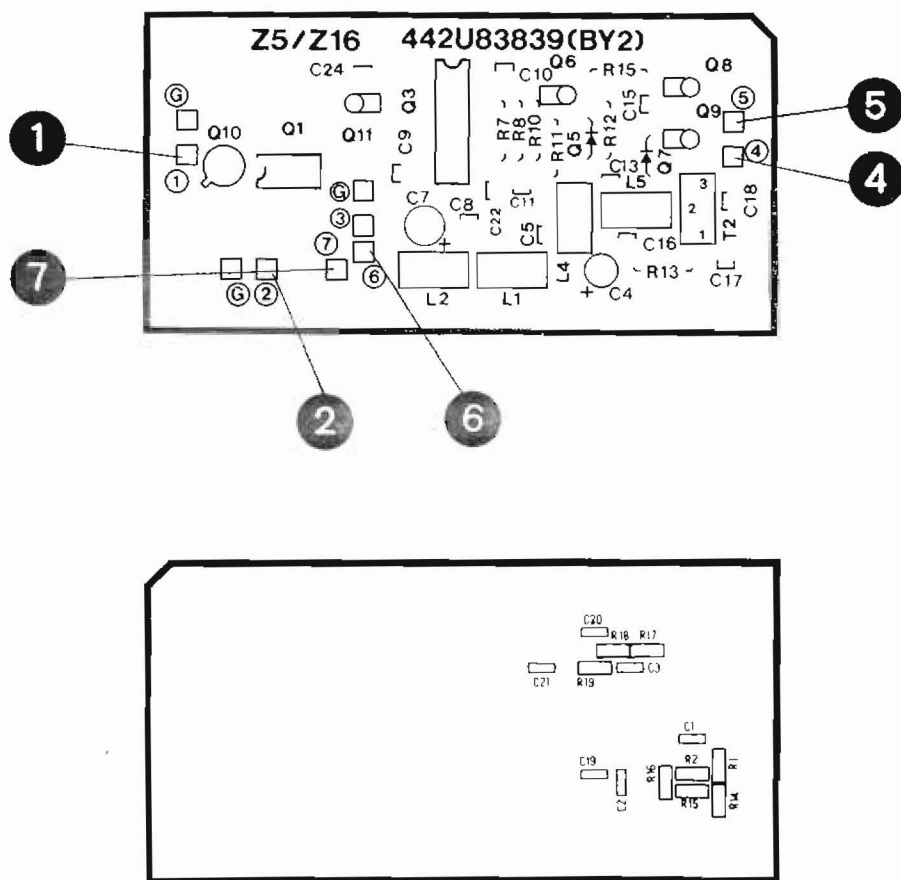
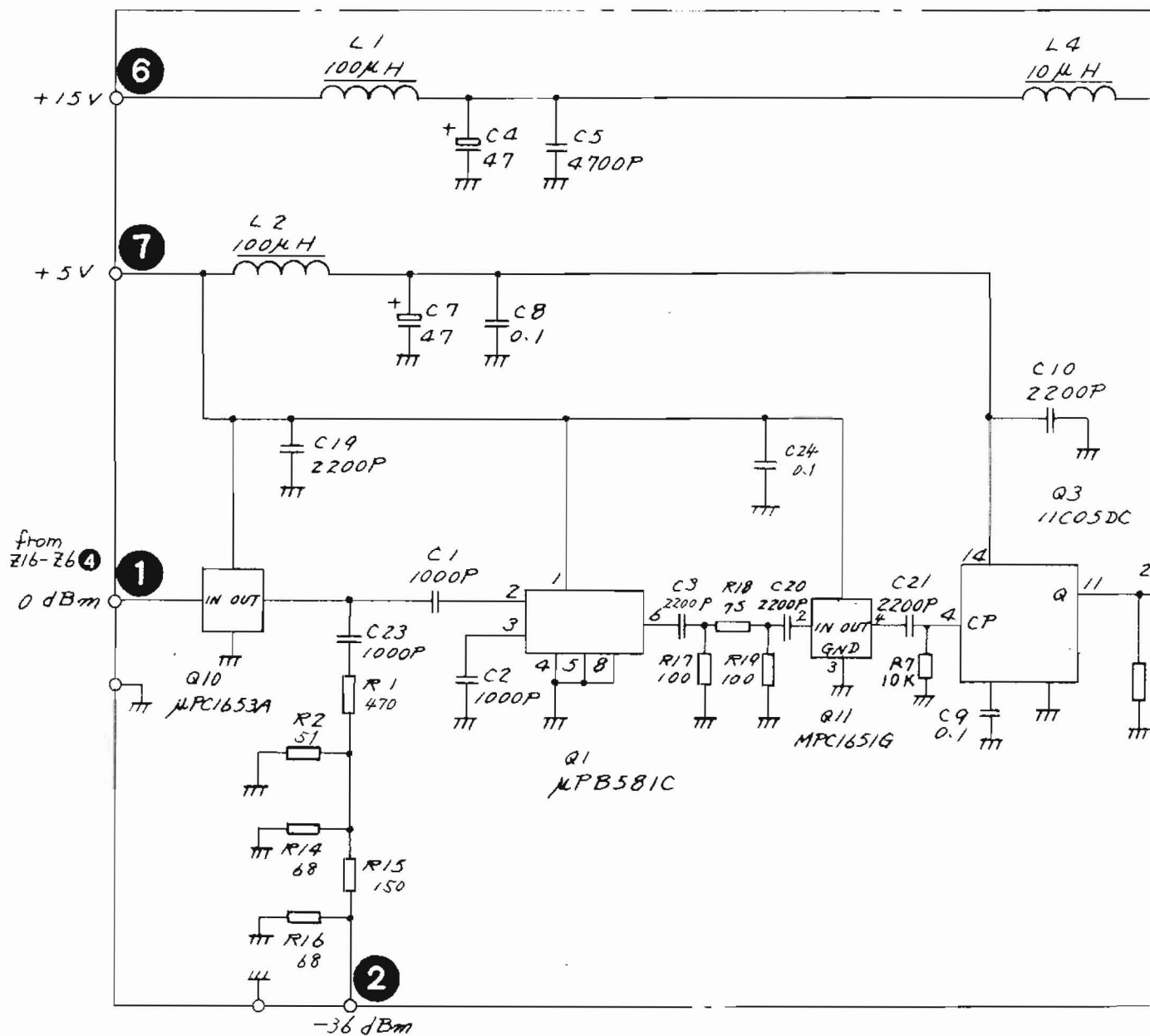


Fig. 5-36 Z16-Z5 Parts Layout



PC Board: 442U83839  
 Parts List: 44W83941





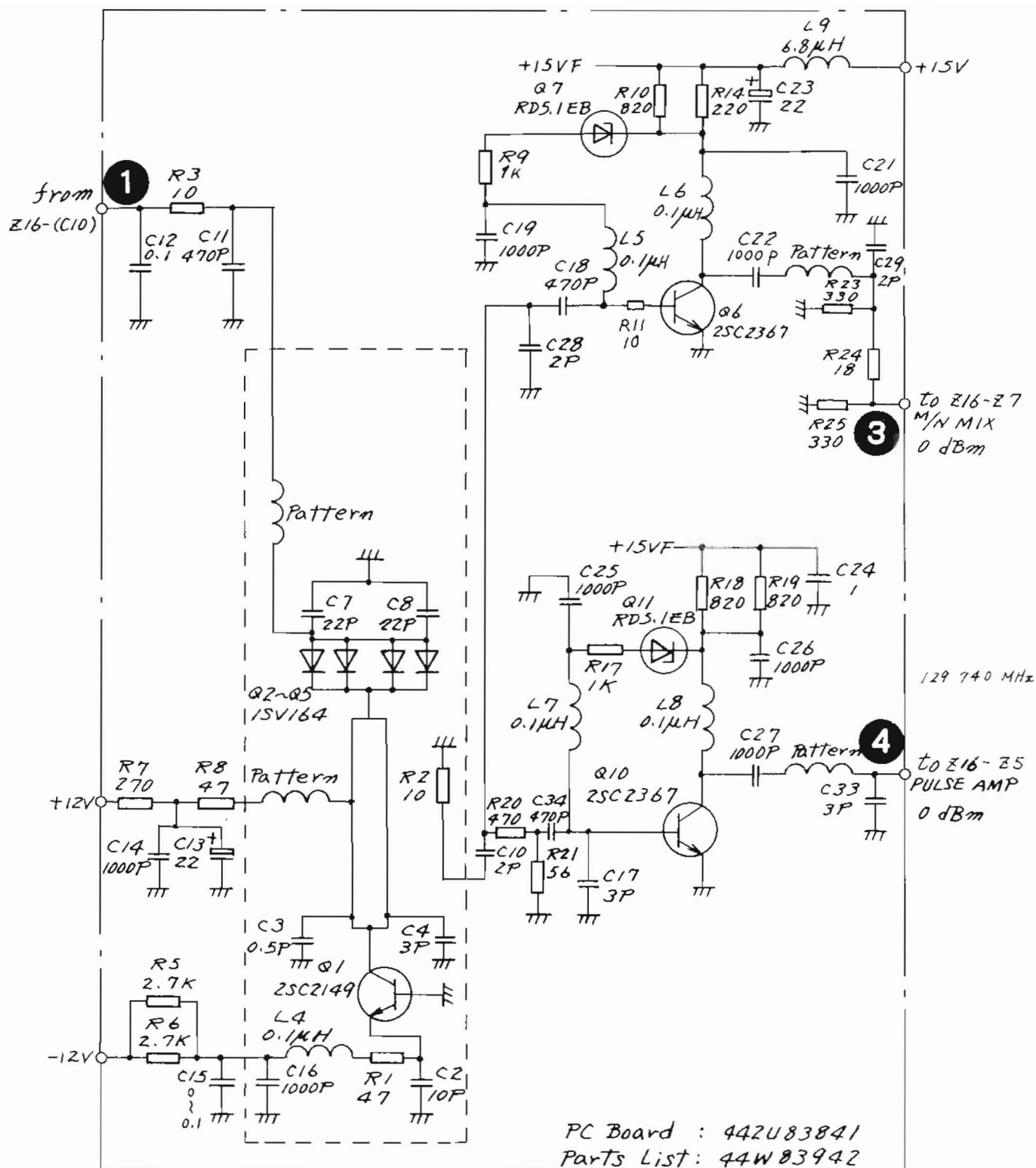


Fig. 5-39 Z16-Z6 N/N VCO  
Circuit Diagram (44W84118)



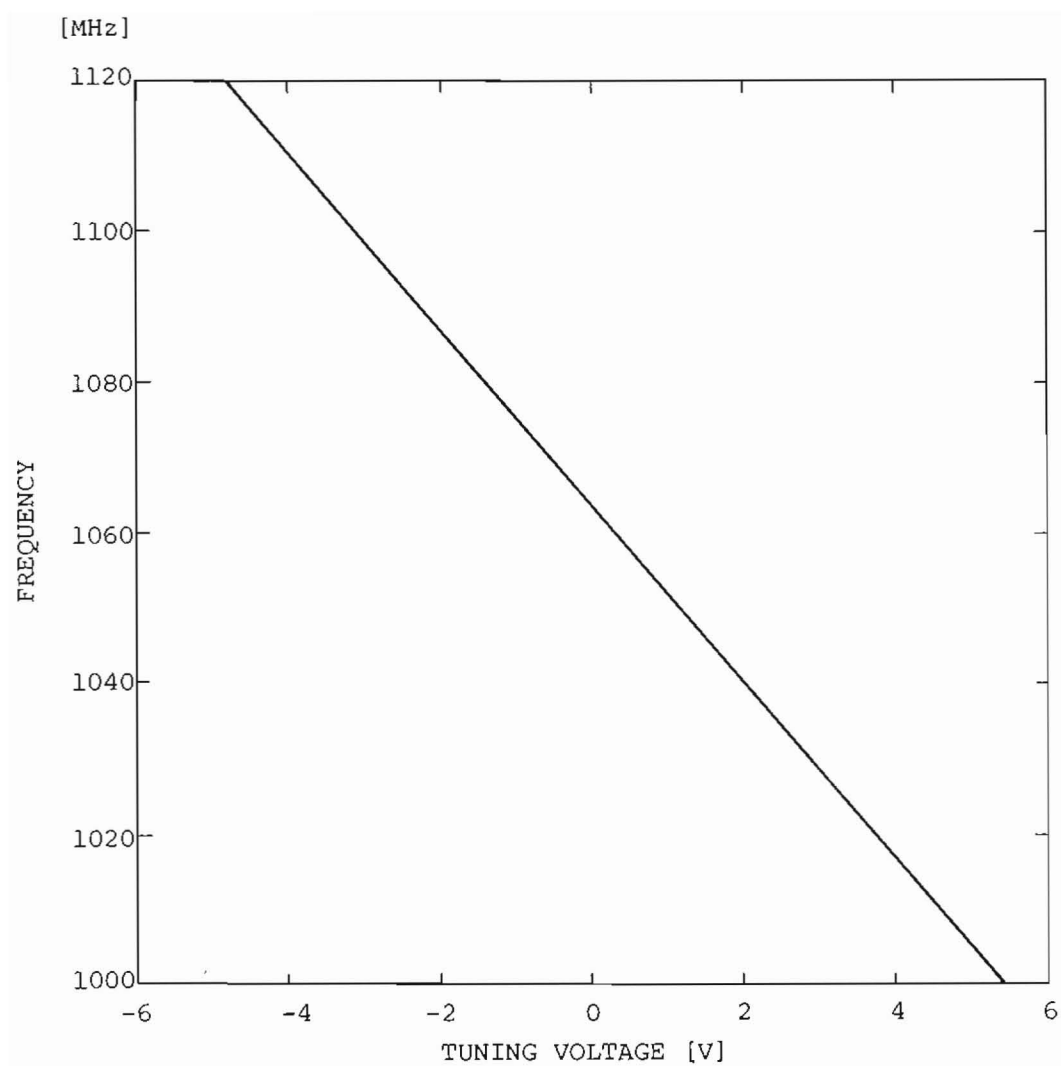


Fig. 5-40 Tuning Characteristics of M/N VCO (Z16-Z6)

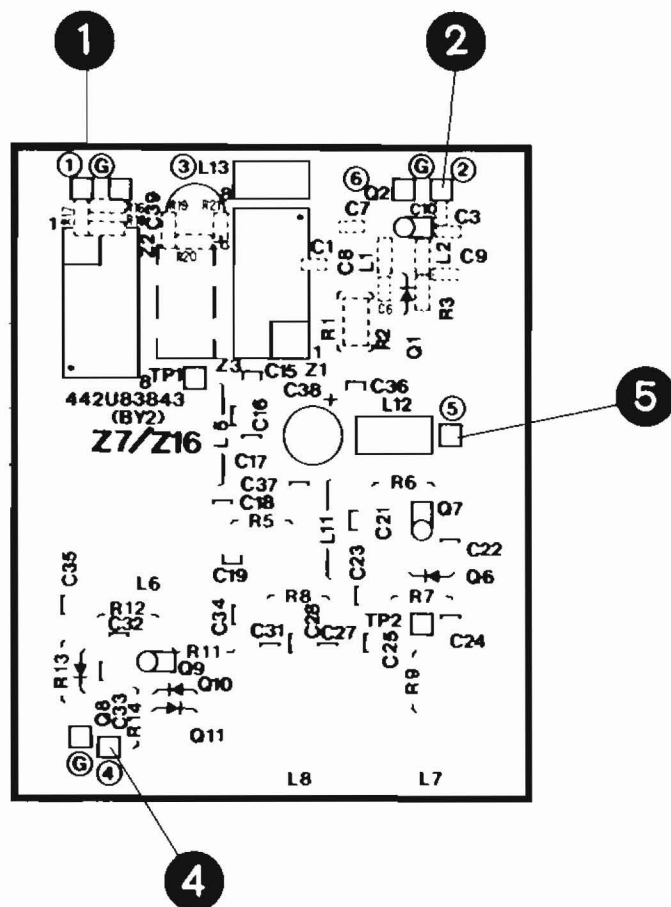
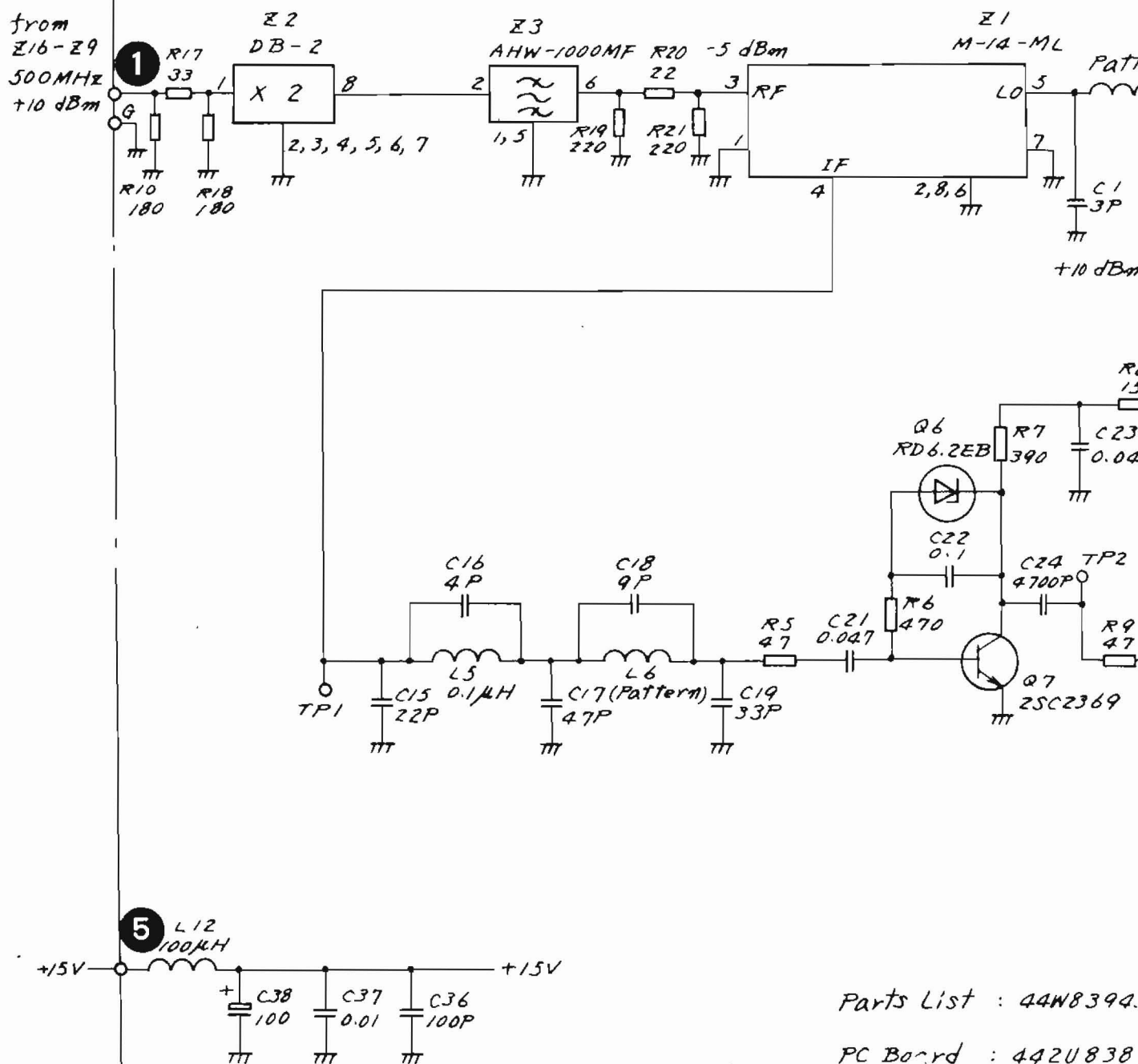
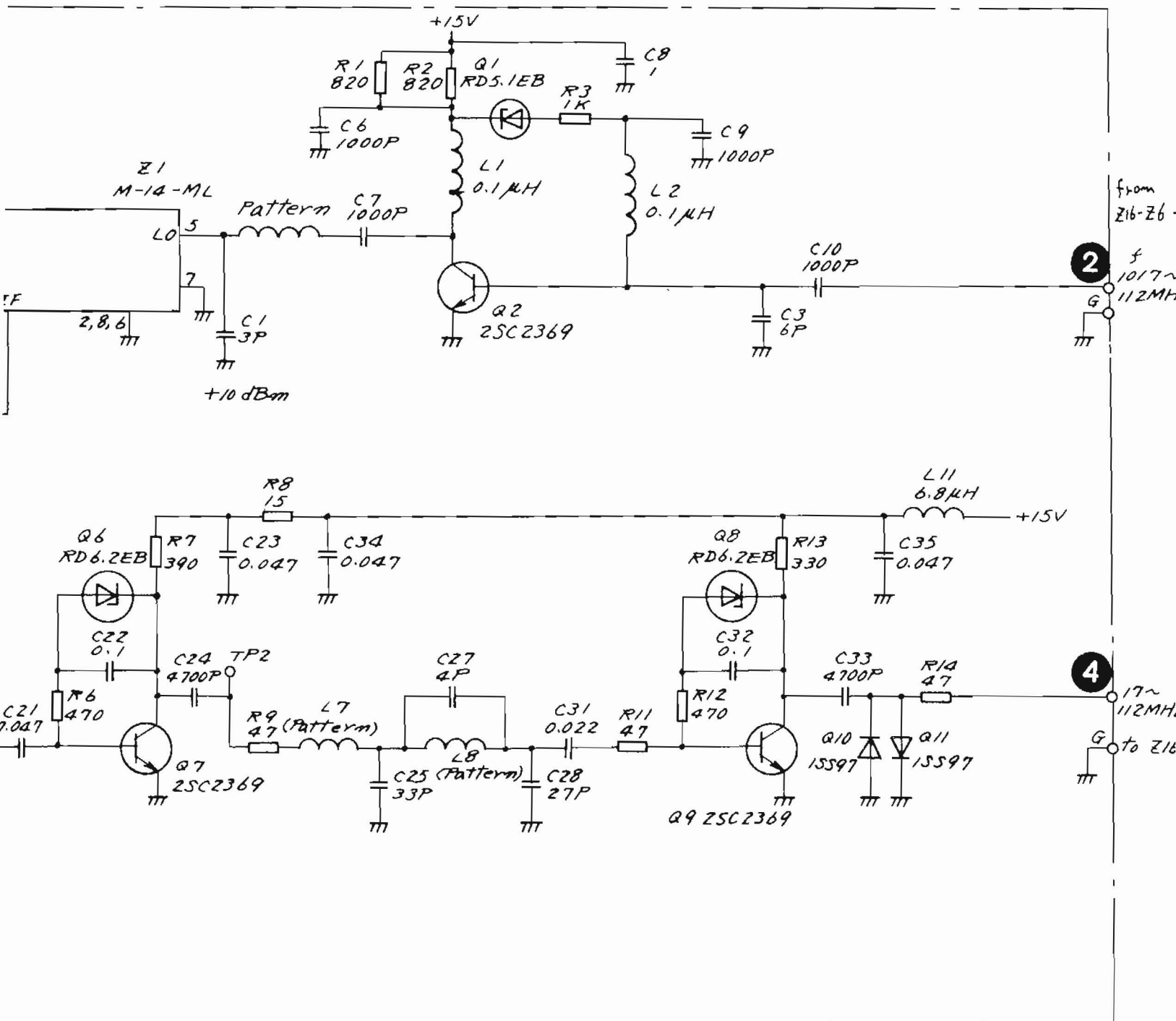


Fig. 5-41 Z16-Z7 Parts Layout

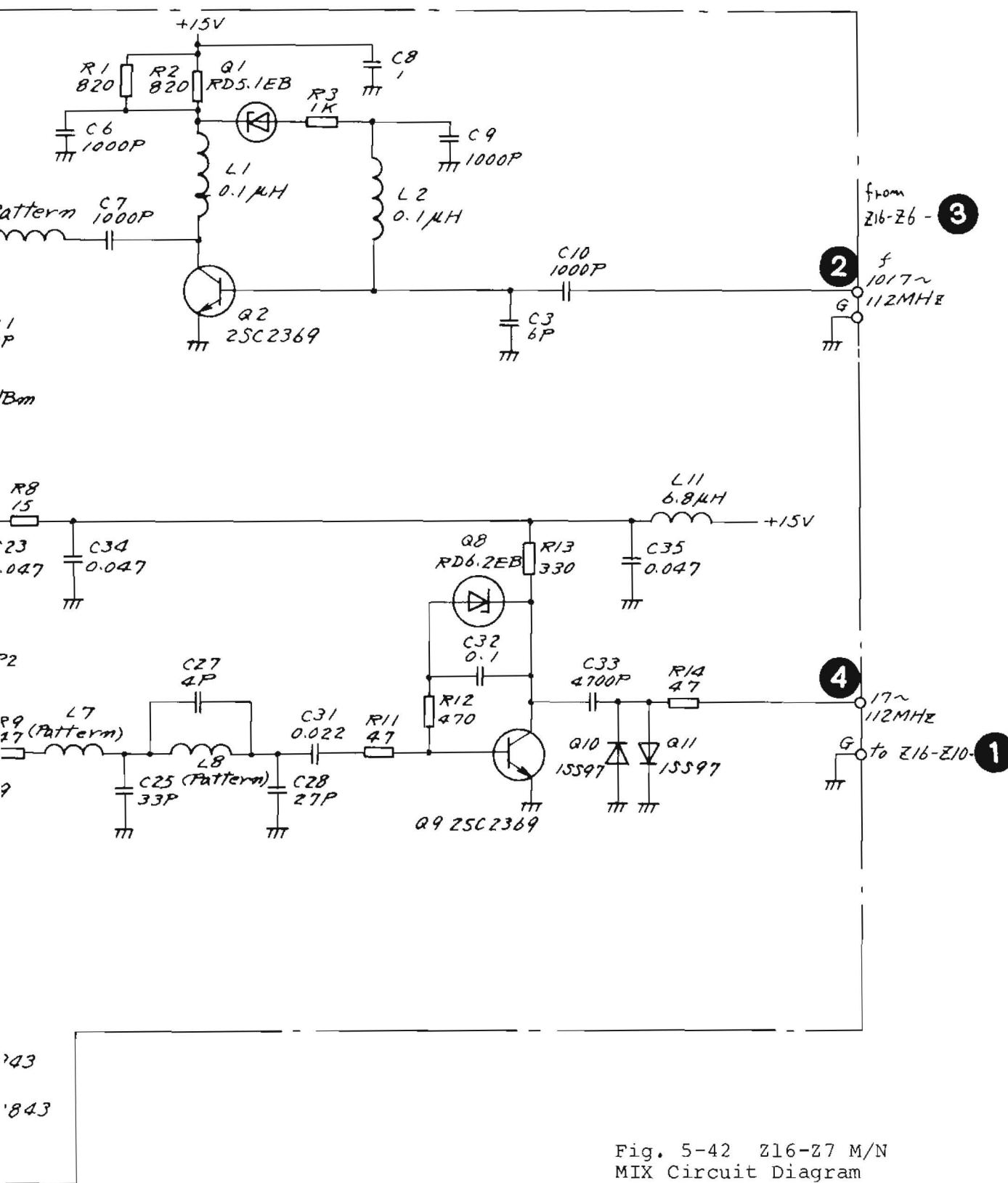


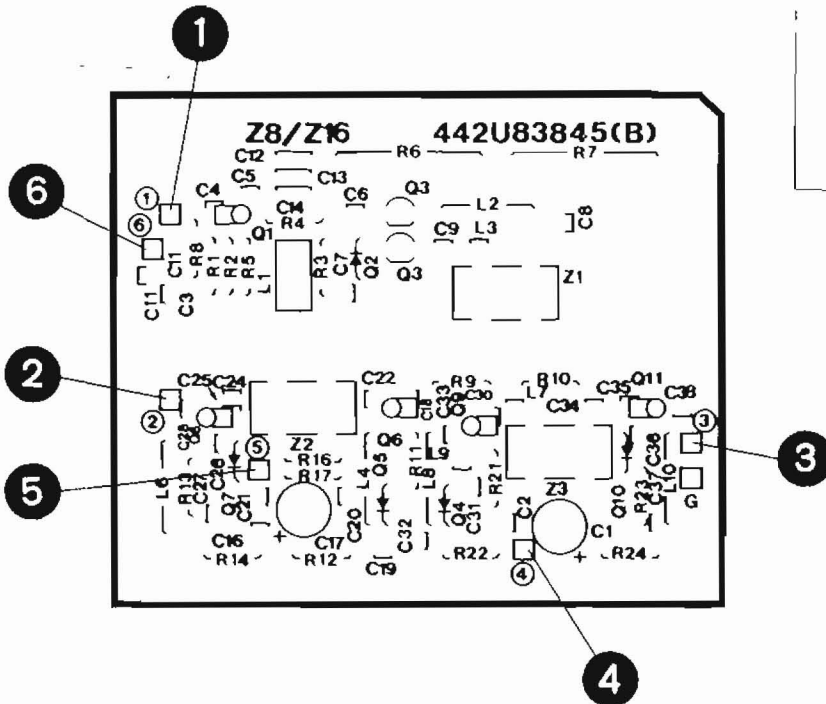
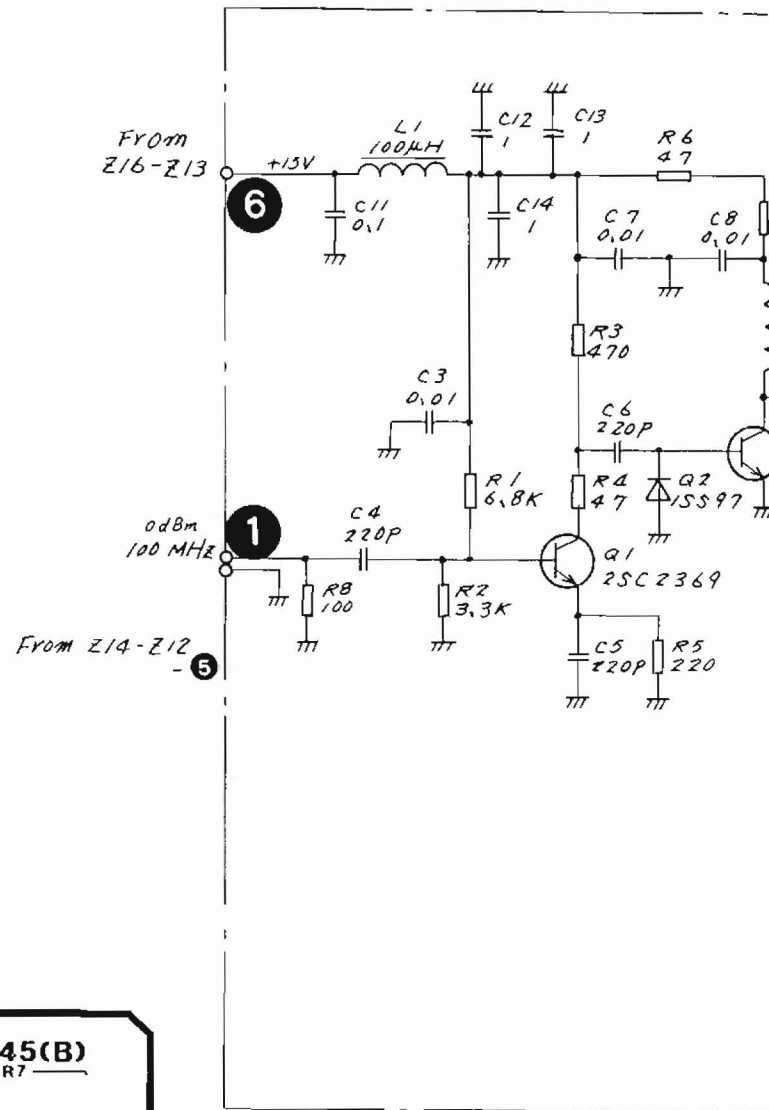


from  
Z16-Z17  
f  
101.7~  
112MHz  
2  
17~  
112MHz  
4  
to Z16

Parts List : 44W83943  
PC Board : 442U83843

Fig. 5-42 Z16-Z17 M/N  
MIX Circuit Diagram  
(43W33947)





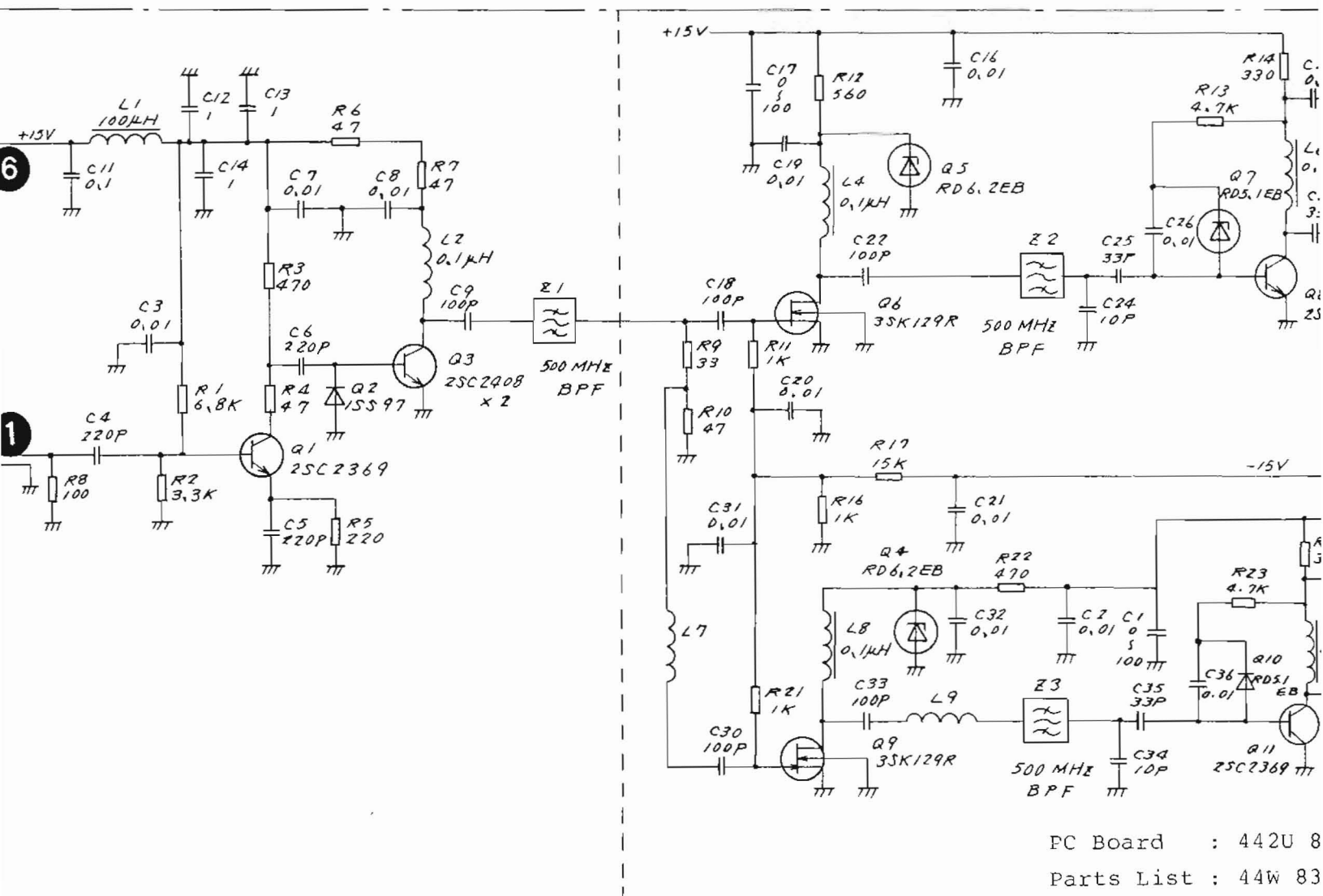


Fig. 5-43 216-28 5  
Circuit I  
Component  
(43W 3394

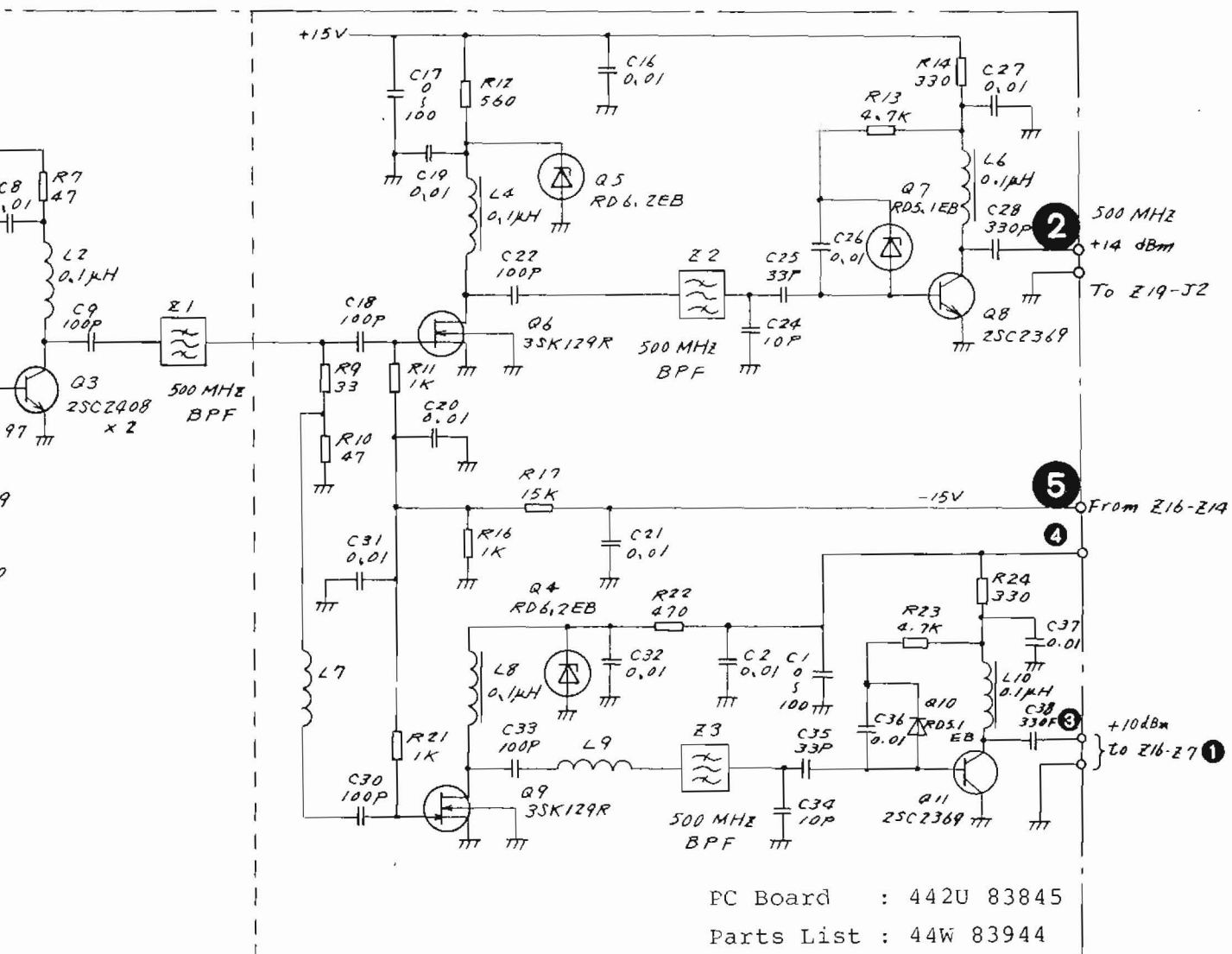
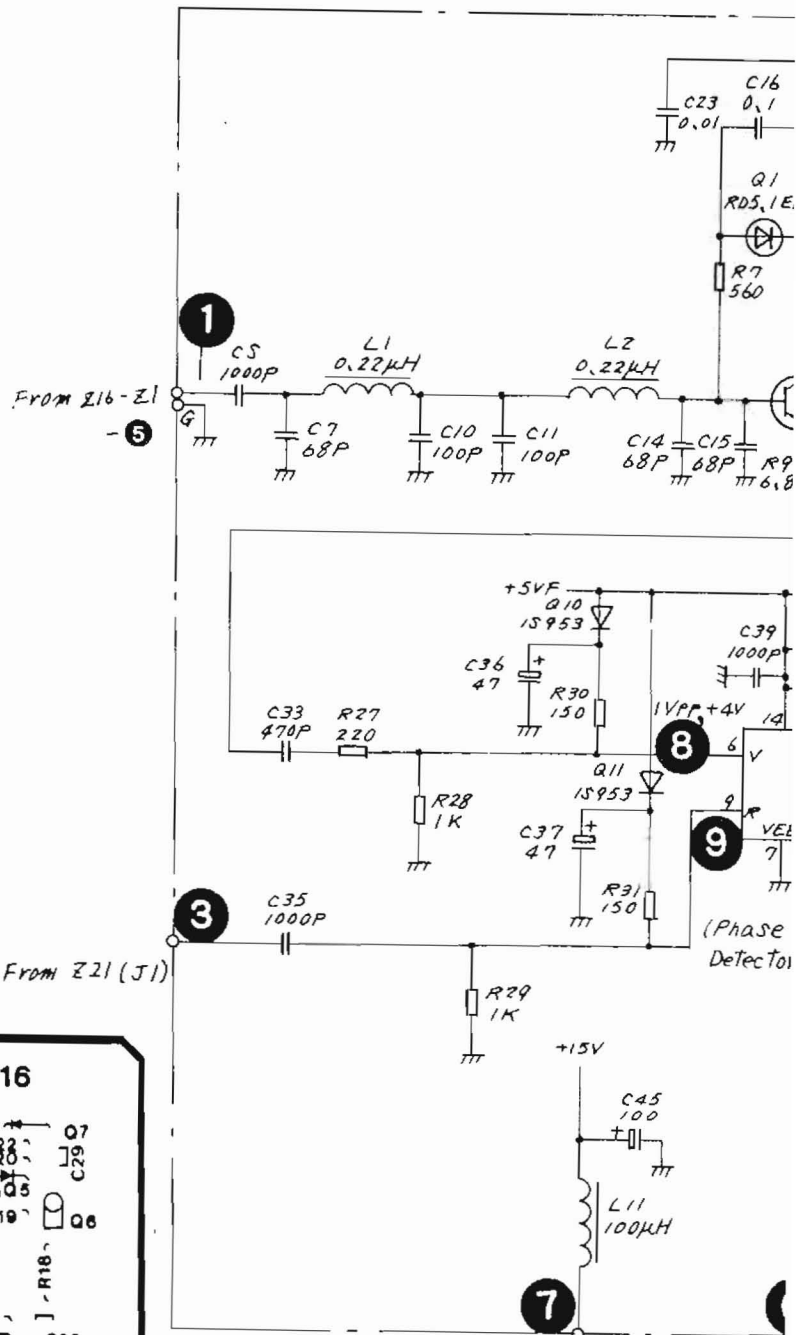
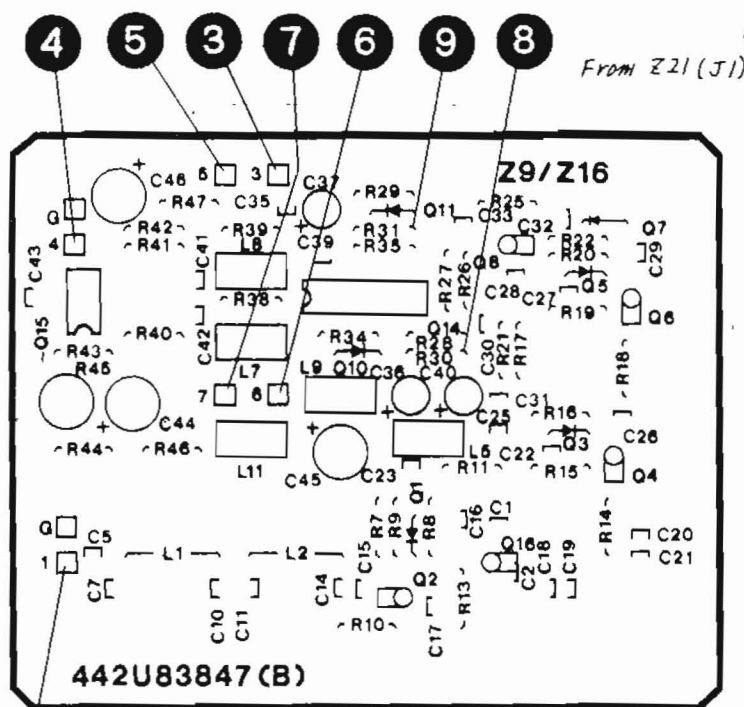


Fig. 5-43 Z16-Z8 5 x 100 MHz  
Circuit Diagram and  
Component Layout  
(43W 33948)





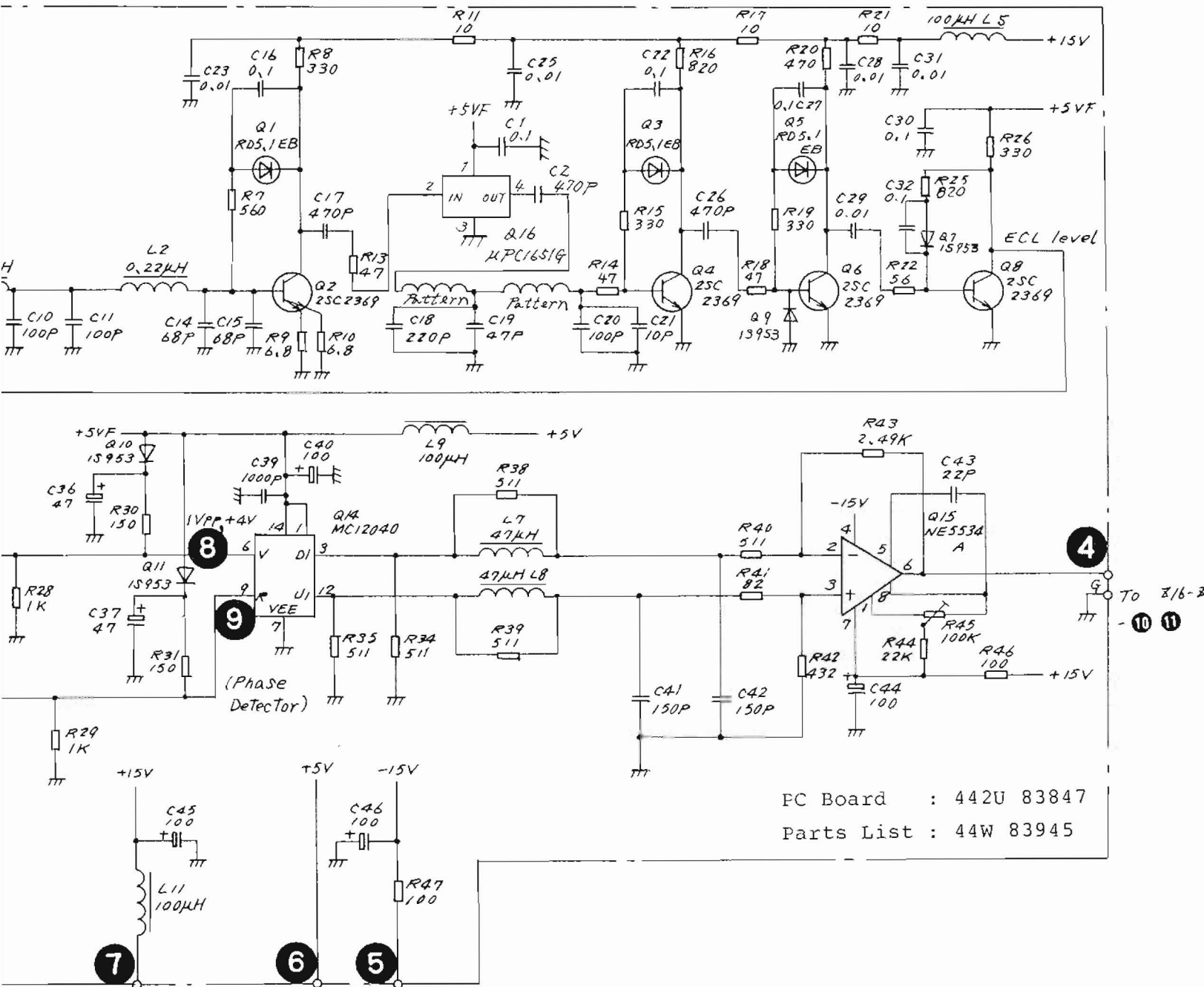


Fig. 5-44 Z16-Z9 YTO PD  
Circuit Diagram and  
Parts Layout  
(43W 33949)

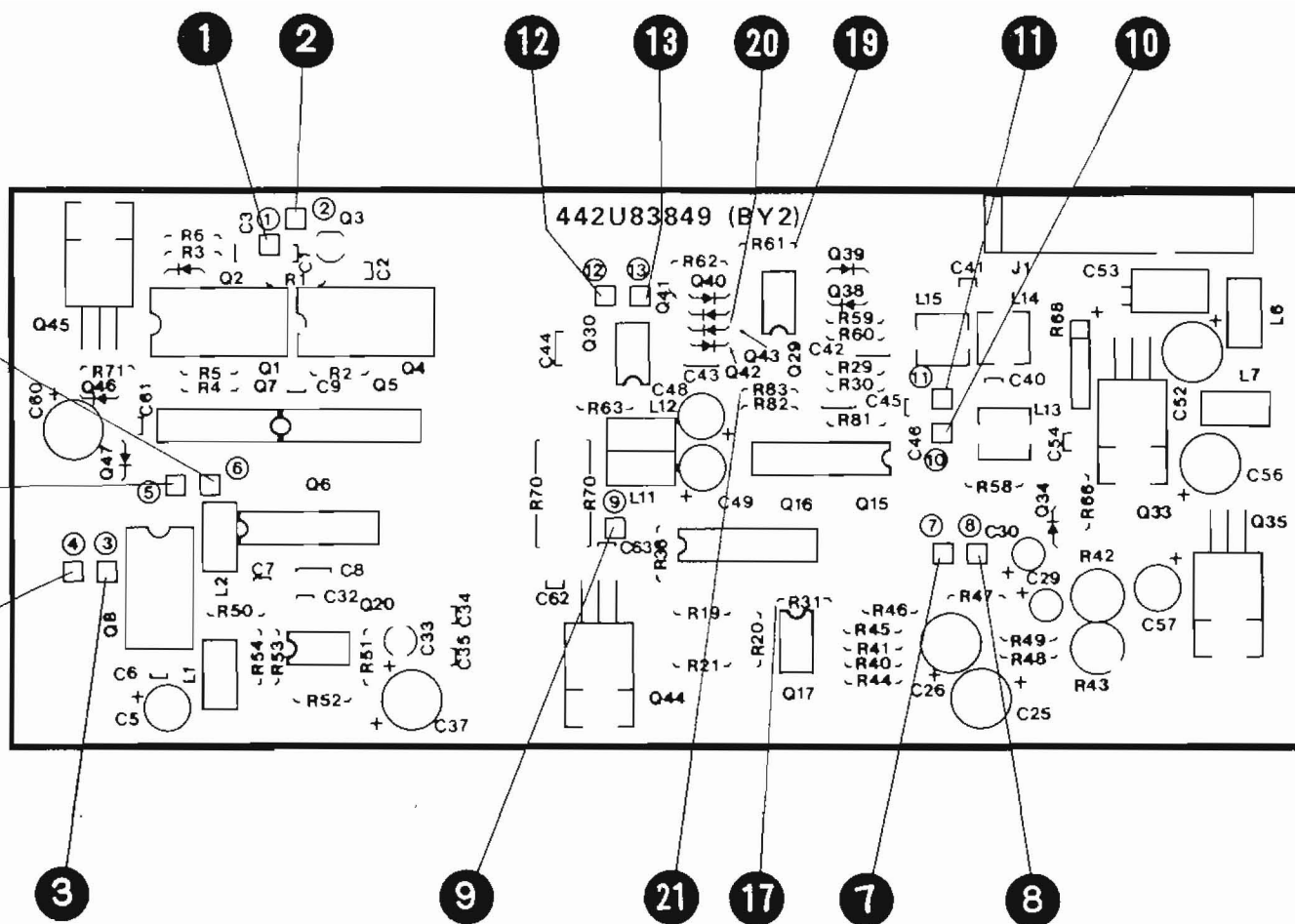
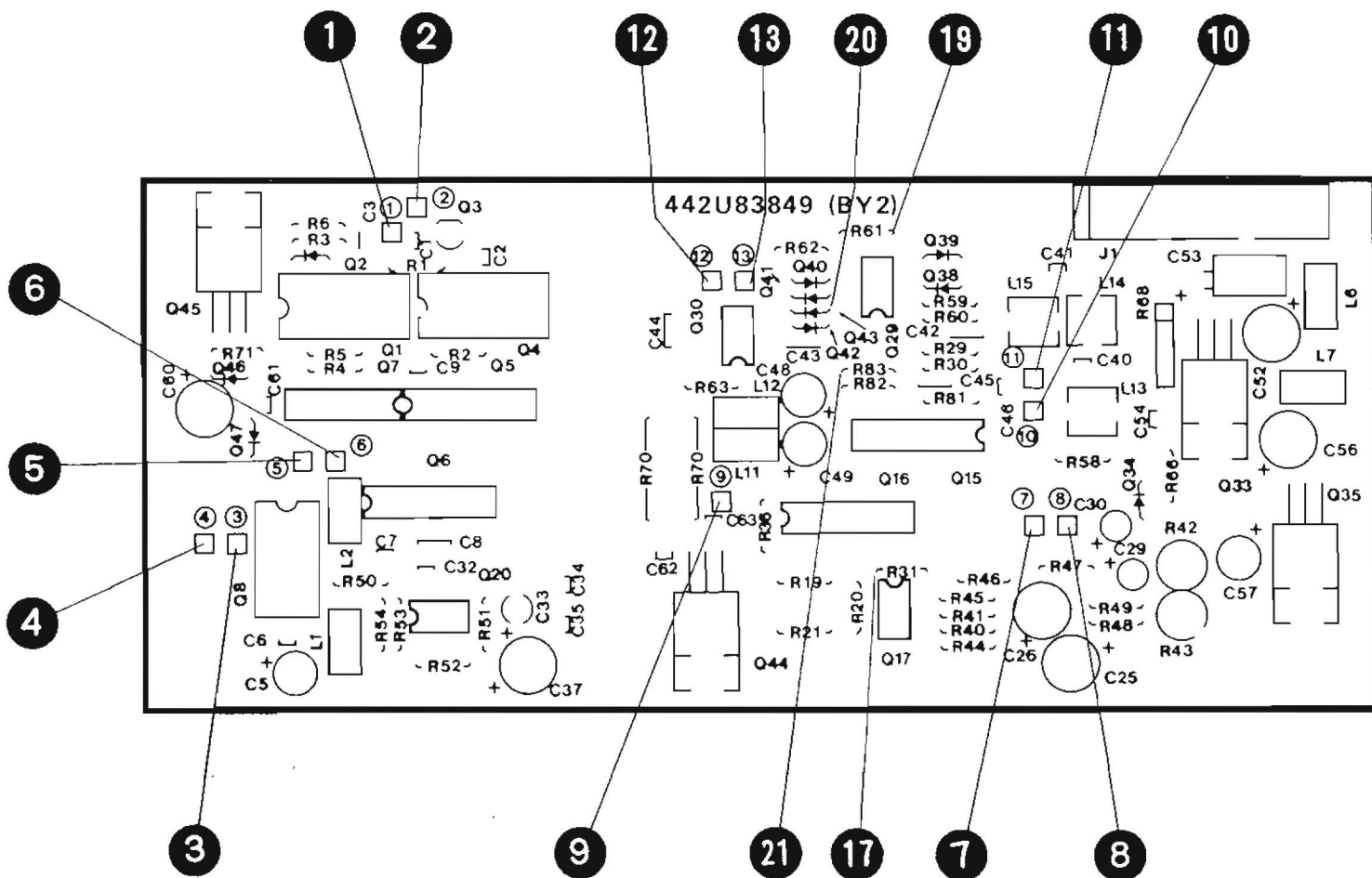
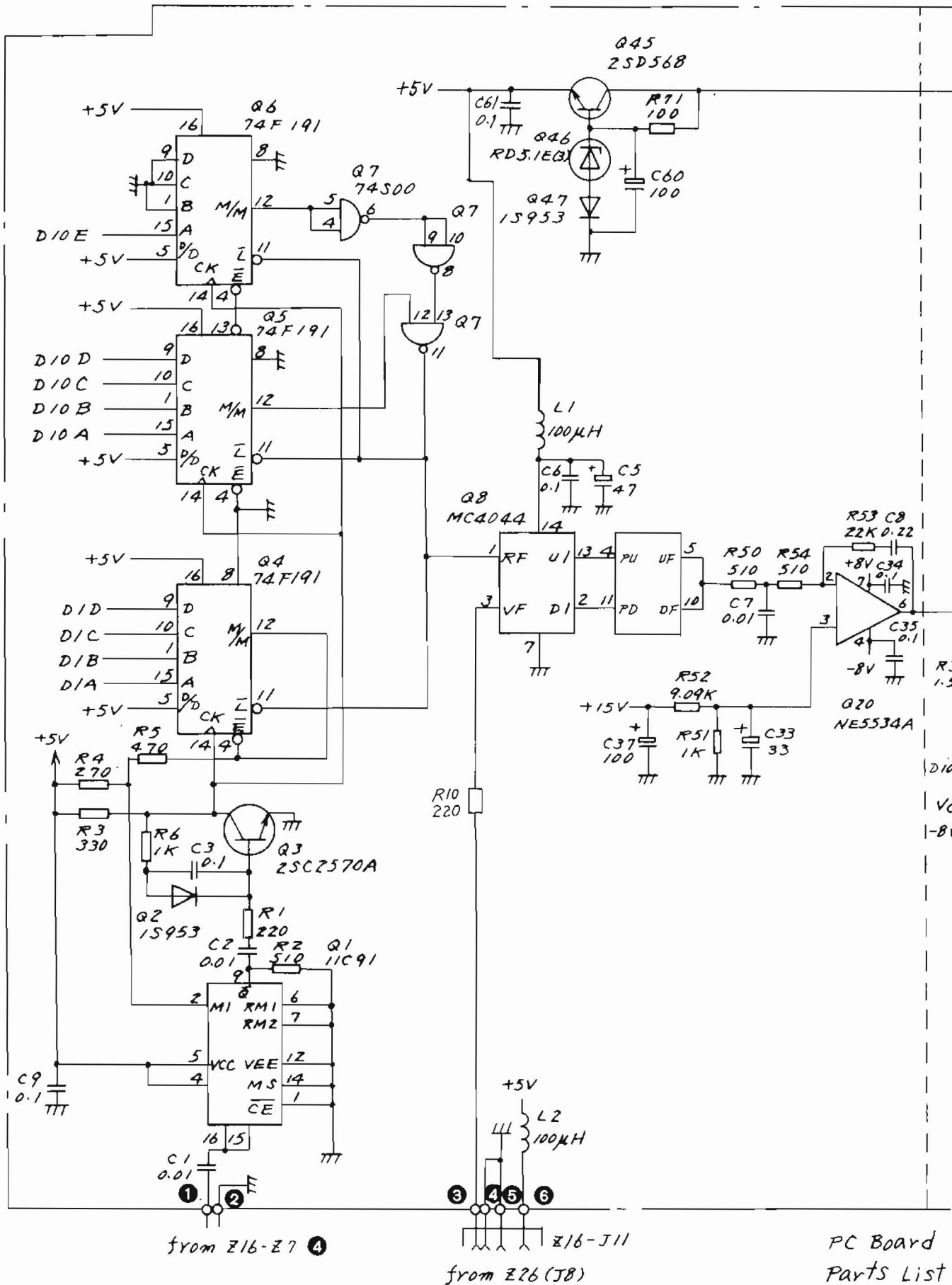


Fig. 5-45 Z16-Z10  
Parts Layout





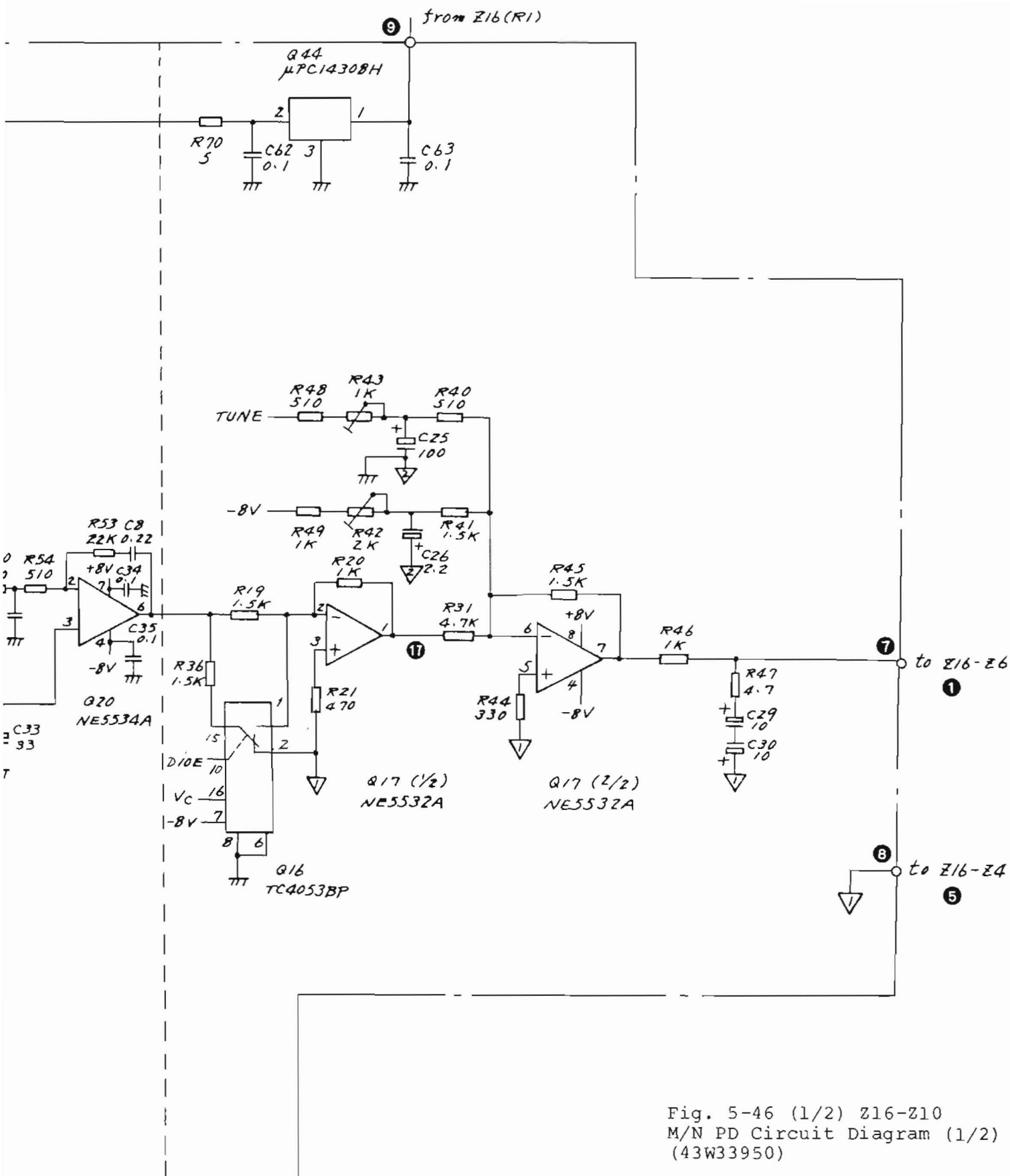
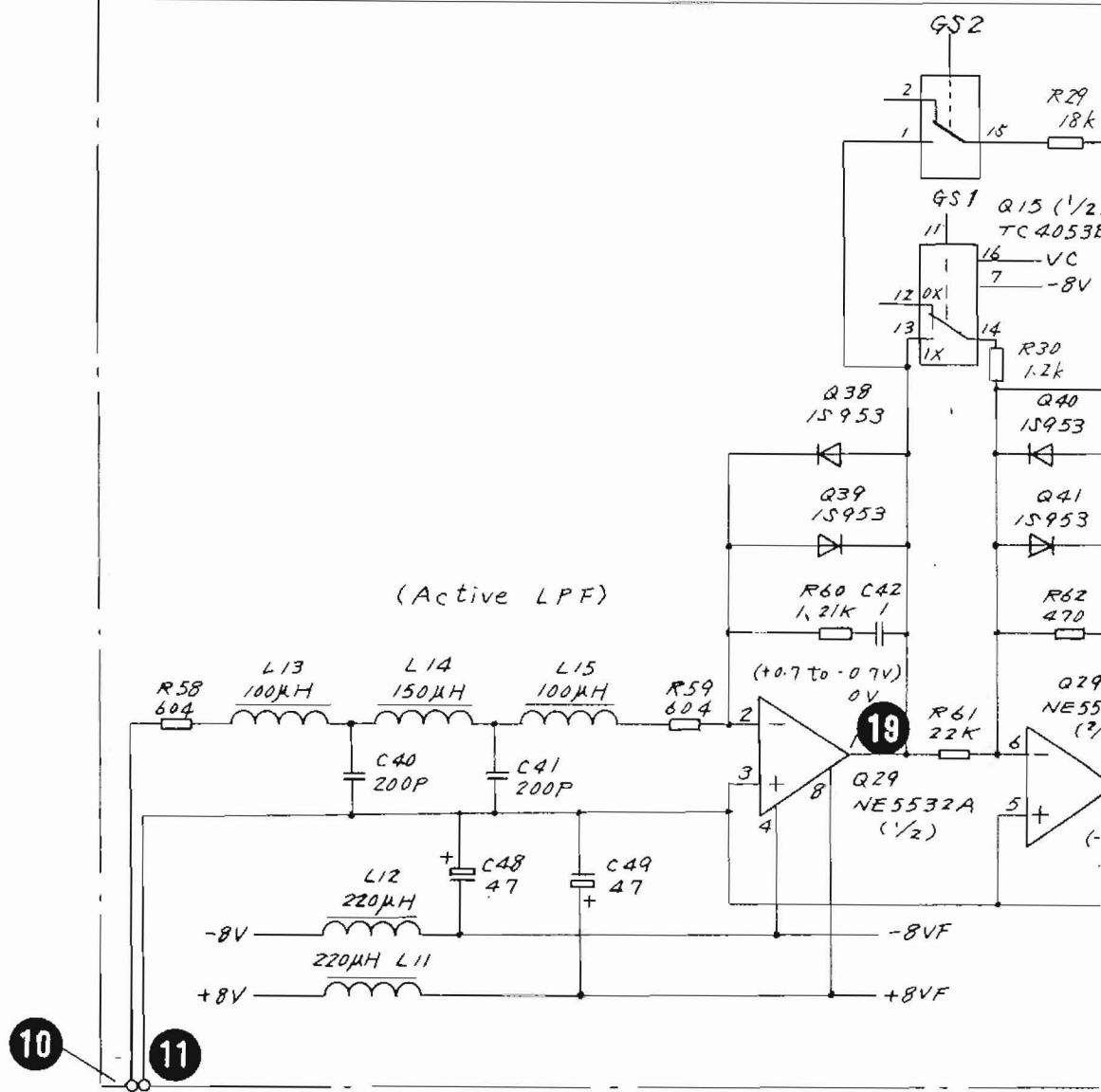


Fig. 5-46 (1/2) Z16-Z10  
M/N PD Circuit Diagram (1/2)  
(43W33950)

PC Board : 44ZU83849  
Parts List: 44W83946

5-93/(5-94 blank)



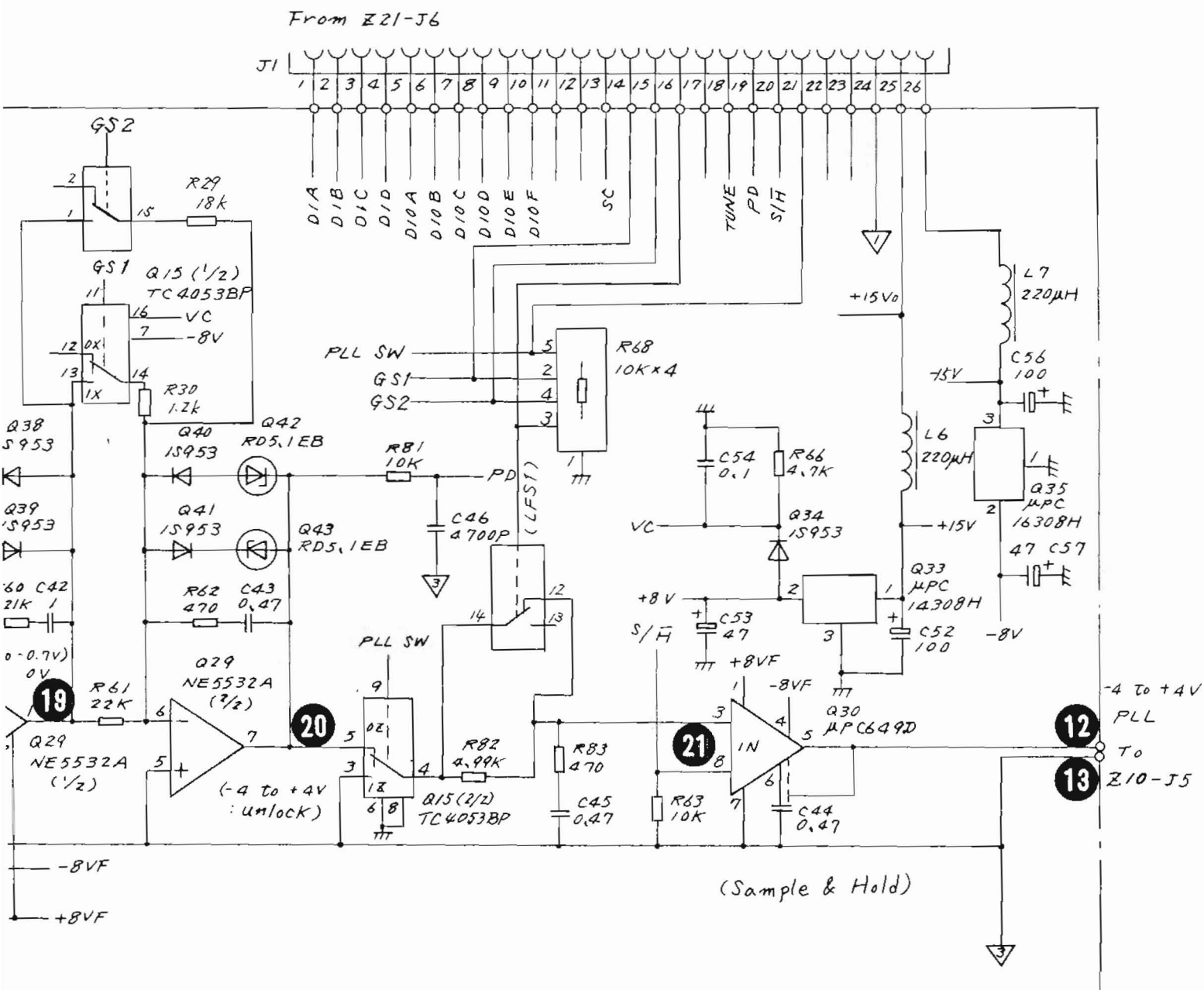
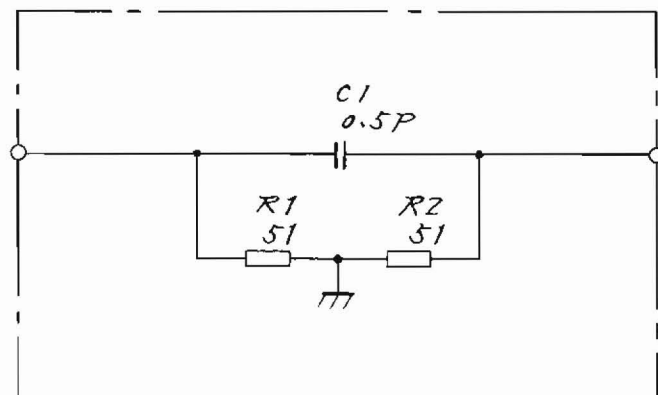


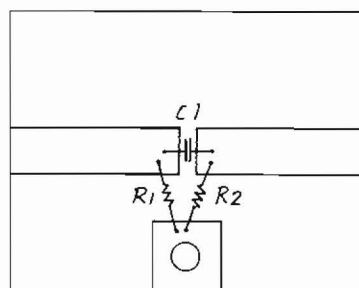
Fig. 5-46 (2/2)  
Z16-Z10 M/N PD Circuit  
Diagram (2/2) (43W 33950)





PC Board : 442U83849

Parts List : 44W85782



Z16-Z15 HPF Circuit Diagram and Parts Layout  
(44W85781)

## 5.8 Z18 $\mu$ 2nd CONVERTER 1 and Z19 $\mu$ 2nd CONVERTER 2

### 5.8.1 Circuit description - Z18 and Z19

(Refer to Fig. 3-3 (1/4), Fig. 5-49 and Fig. 5-50)

Z18 includes the amplifier Z18-Z2 (hybrid IC: gain 7 dB) which amplifies the 521.4 MHz first IF signal from the Z36 EXT IF AMP and two Helical resonator BPFs (Z18-Z1 and Z18-Z3) whose configuration is functionally arranged to incorporate the amplifier. The BPFs included in Z18 are used to remove image signals (478.6 MHz).

Z19 mixes the 521.4 MHz IF signal sent from Z18 and the 500 MHz second local signal sent from the Z16-Z8 5 x 100 MHz circuit, and converts the 521.4 MHz IF signal into a 21.4 MHz IF signal. The PIN diode attenuator and amplifier of Z19 are used to compensate the Z6-Z2 mixer conversion loss characteristics. Then, the 21.4 MHz IF signal is sent to the IF selection circuit. Selection of this IF signal (10 kHz to 30 MHz, 1.7 to 23 GHz and external mixer band) or the (100 kHz to 2 GHz band) IF signal sent from the Z14 0 to 2 GHz RF block is performed by the relay K1 of Z19. A selected IF signal is sent to the Z22 IF BPF/AMP 1 circuit through Z19-J4.

The power and control signals sent to Z18 and Z19 are supplied from the Z21 local control 1 PC board through Z24-J6.

Z18 and Z19 are packaged in a long, narrow aluminum case as shown in Fig. 5-47. This case is mounted on top of the Z16 PLL block case.

### 5.8.2 Checking Procedure - Z18 and Z19

Step	Procedure
1.	Remove the top cover. See Fig. 5-47.
2.	Set the center frequency to 4 GHz.
3.	Input a 521.4 MHz, -20 dBm signal to Z18-J1 from a signal generator.
4.	Observe the Z19-J4 output using a spectrum analyzer. It is normal if the signal is 21.4 MHz and -10 to -15 dBm.
5.	Change the center frequency to 23 GHz. Confirm that the Z19-J4 output rises approximately by 20 dB. When there is no change in the output, confirm that "GC1" and "GC2" control signals connected to pins 5 and 6 of the Z19-J6 have changed. If they have not changed, the Z21 local control 1 may be faulty.
6.	If there is no 21.4 MHz IF output at Z19-J4, check the output at Z16-J4 connected to Z19-J2. If the output at Z16-J4 is about 500 MHz, +13 dBm, it is normal.
7.	Press the 100 kHz to 2 GHz band switch.
8.	Input a 21.4 MHz, -10 dBm signal to Z19-J3 from a signal generator, and confirm that the same signal (21.4 MHz, -10 dBm) is output to Z19-J4.

(cont.)

Step	Procedure
9.	If it is determined from the above check that the Z18 and Z19 internal circuits are faulty, remove the case that holds them by unscrewing the front and rear screws securing the case to the Z16 PLL block.
10.	Check the signal levels at the checkpoints shown in Figs. 5-49 and 5-50.

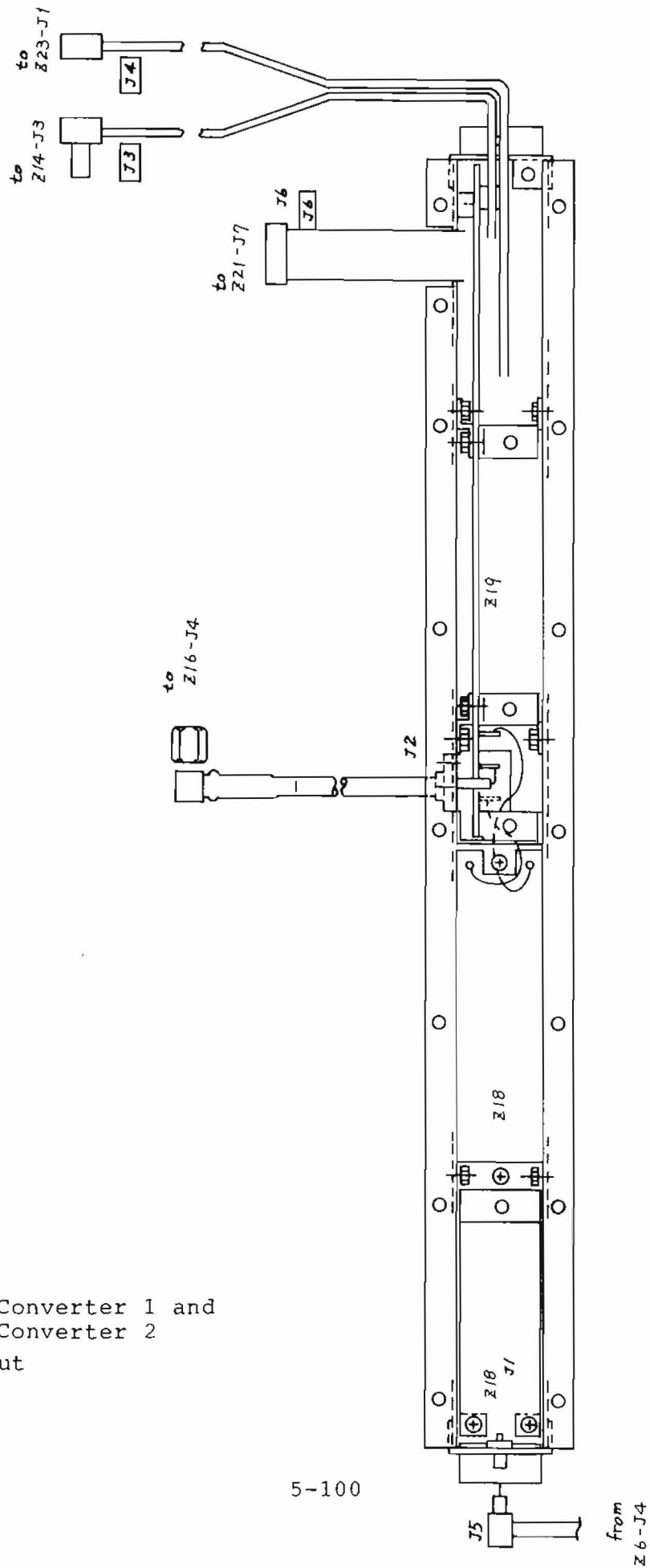
#### 5.8.3 Adjustment - Z18 and Z19

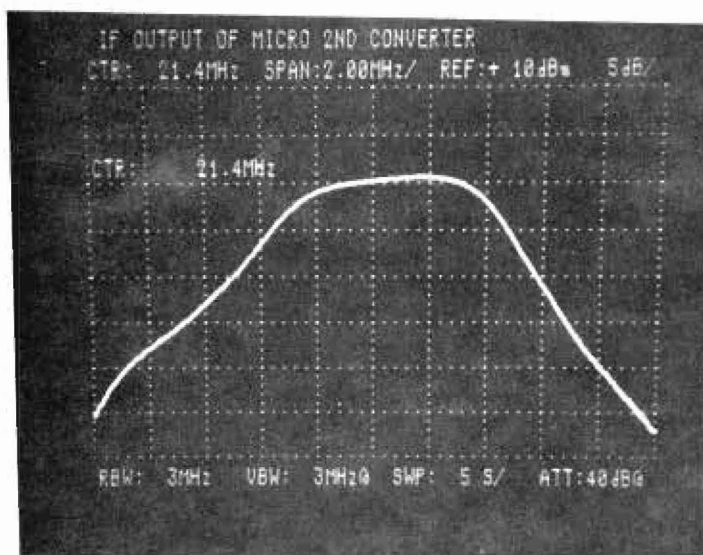
Adjust the 521.4 MHz BPF of Z18-Z1 and Z18-Z3 as follows.

Step	Procedure
1.	Input a 3 GHz (2 to 6 GHz is acceptable), 0 dBm signal to the MS710[ ] from a signal generator.
2.	Set the center frequency to the input signal frequency and the span to 10 MHz/div.
3.	Observe the 21.4 MHz IF output at the Z18-J4 using another spectrum analyzer, and adjust the Z18-Z1 and Z18-Z3 adjustment screws so that the waveform shown in Fig. 5-48 is obtained.

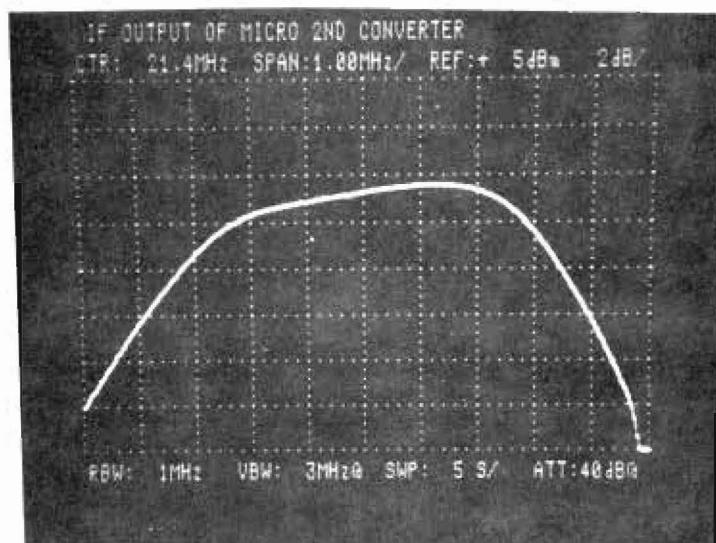
Fig. 5-47

Z18  $\mu$  2nd Converter 1 and  
Z19  $\mu$  2nd Converter 2  
Parts Layout



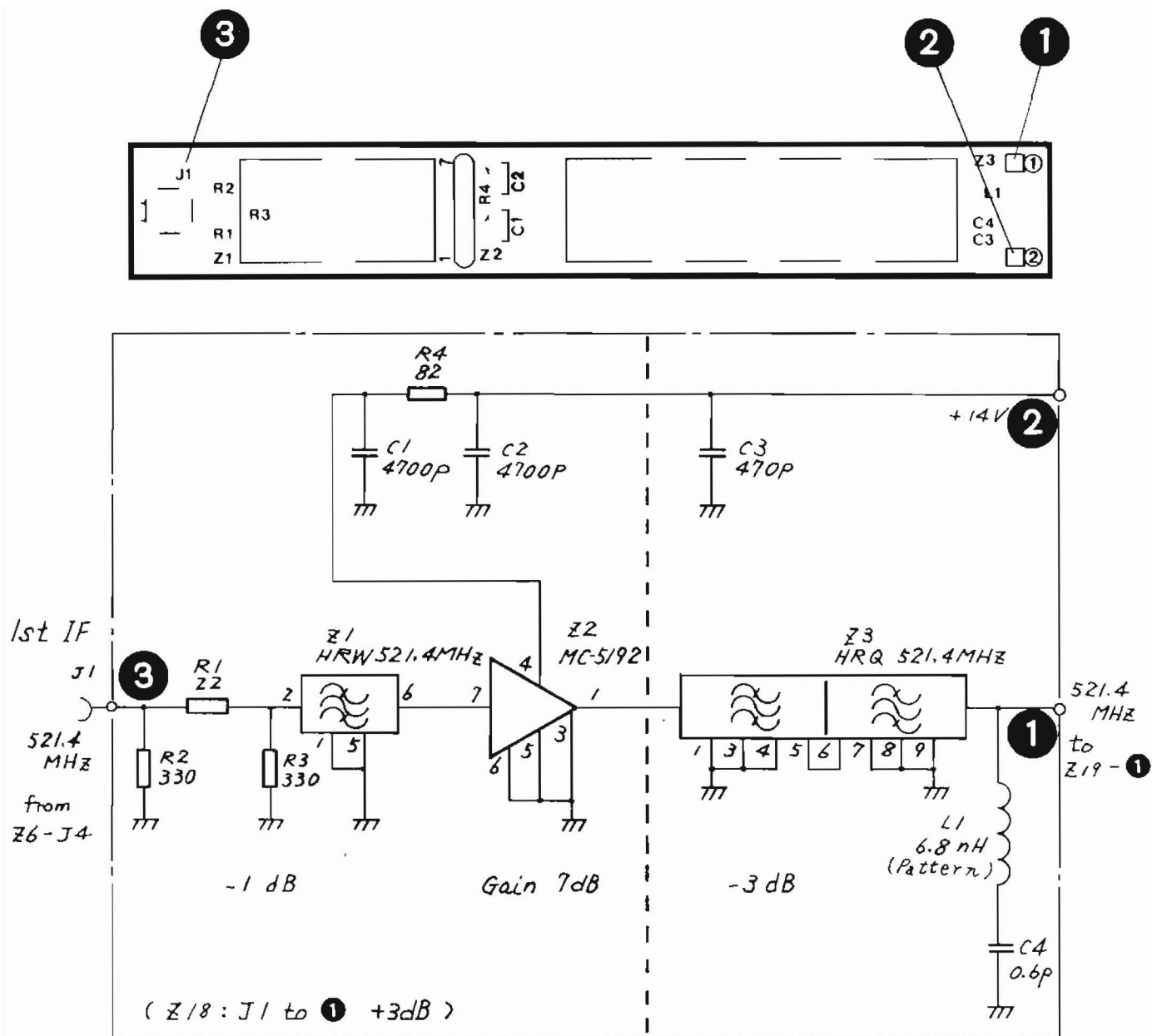


(1) SPAN 2 MHz/div,  
 5 dB/div



(2) SPAN 1 MHz/div,  
 2 dB/div

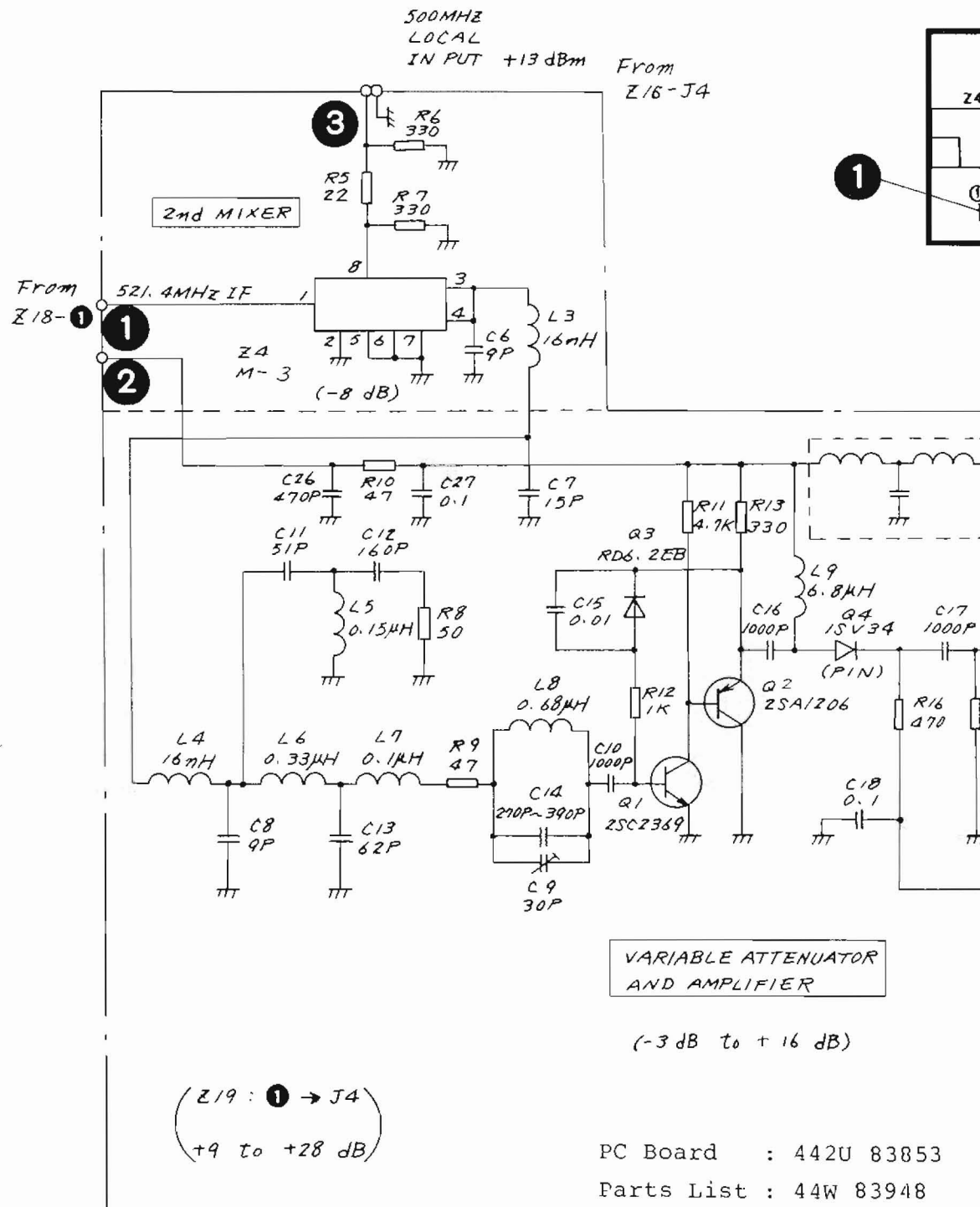
Fig. 5-48 Z18 BPF Adjustment



PC Board : 442U 83851

Parts List: 44W 83947

Fig. 5-49 Z18  $\mu$  2nd CONVERTER 1 Circuit Diagram and Parts Layout (44W84119)





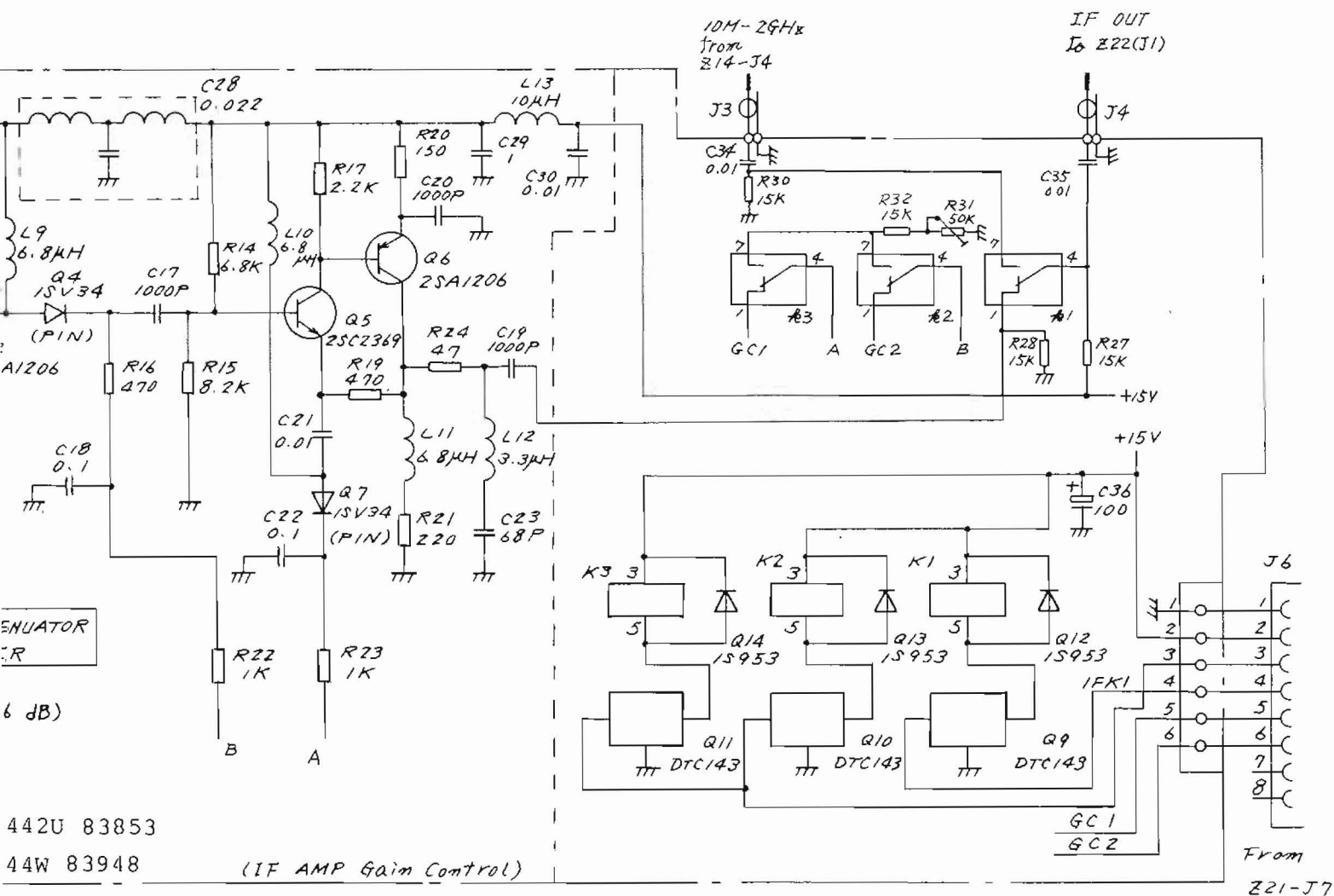
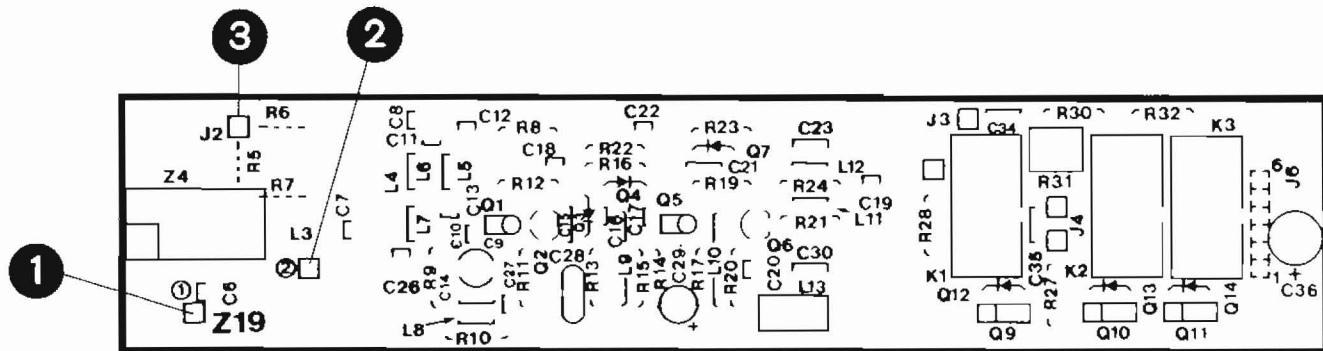


Fig. 5-50

Z19 μ 2nd CONVERTER 2  
Circuit Diagram and Parts Layout  
(43W 33951)

5-103/(5-104 blank)

## 5.9 Z21 LOCAL CONTROL 1

### 5.9.1 Circuit description - Z21

(Refer to Fig. 3-3 (4/4) and Fig. 5-55)

With the MS710[ ], except the 10 kHz to 30 MHz band of the MS710C, the center frequency setting and span setting data are all supplied to the Z9 1st LOCAL OSC (YTO). All the oscillators in the 2nd LOCAL OSC (Z14-Z8 and Z14-Z6) are fixed frequency oscillators.

The main role of Z21 local control 1 is generation of the signals which control the Z9 1st LOCAL OSC (YTO) output frequency and sweep frequency. Moreover, the Z5 YTF tune signal and 1.7 to 23 GHz band flatness compensation signal are generated from this YTO control signal in Z21. The 1.7 to 23 GHz band mixer bias signal is also generated in this Z21.

In the 10 kHz to 30 MHz band, the VCO in the Z28 low local 1 is used as the 1st local oscillator instead of the Z9 YTO.

The signals generated in the Z21 local control 1 are used to control the 1st local VCO in Z28 after they are modified in the Z24 local control 2.

As the function of the Z21 local control 1 can be adequately demonstrated with 100 kHz to 2 GHz band and 1.7 to 23 GHz band operation, the Z21 circuit is described only on these 2 frequency bands.

- (1) Tuning voltage generation (Main Tune, M/N VCO Tune, and Fine Tune)

There are three VCO (Z9 YTO, Z16-Z6 M/N VCO, and REF VCO in Z21) in the MS710[ ] 1st LOCAL OSC (YTO) control system. Z21 local control 1 uses a D/A converter to generate each tuning voltage from the digital signals which come from the Z26 CPU board for these VCOs.

Basically, the MT (Main Tune) signal is generated from the Z21-Q33 D/A converter and supplied to the Z9 YTO; the Z16-Z6 M/N VCO tuning voltage (VCO tune) is generated by the Q71 D/A converter in Z21 and supplied to the Z16 PLL BLOCK. The FT (Fine Tune) signal is generated by the two D/A converters Q41 and Q43 and supplied to the Q1 and Q2 REF VCO to generate the 17.4 MHz reference signal on this Z21 PC board.

(2) Sweep signal control (VCO Sweep, FM Sweep, and Main Sweep)

The sweep reference signal (constant amplitude ramp) supplied from the Z26 CPU board is passed through the multiplying D/A converter Z21-Q47, 1/2 and 1/20 switching circuit Z21-Q50, and a 1/N amplitude divide circuit Z21-Q53. It is finally converted to a RAMP signal of the necessary amplitude. Thereafter, when the sweep width is a narrow bandwidth sweep of 1 MHz (100 kHz/div) or less, this ramp signal is supplied to the Q1 and Q2 REF VCO on this PC board.

However, when the sweep width is 1.01 MHz to 20 MHz (101 kHz/div to 2 MHz/div), the signal is supplied to the YTO FM coil drive circuit (Z10), and when the sweep width is 21 MHz to 2 GHz (2.1 MHz/div to 200 MHz/div), it is supplied to the YTO main coil driver circuit (Z10).

(3) REF VCO circuit

The 100 kHz and the lower values of the frequency of the 1st LOCAL (Z9, YTO) are controlled by the frequency of the REF VCO of Z21, which is the reference frequency of the main PLL of Z16.

The signal from the REF VCO (which consists of oscillation elements of Q1 and Q2, and the tank circuit of L1, Q3, Q4, and C9) is divided by 8 using Q9, Q12 and becomes fREF (17.4 +1.5/-0.5 MHz). This fREF signal is supplied to Z16-Z9 YTO PD in the Z16 PLL BLOCK through the Z21-Q13 buffer amp and Z21-J1.

On the other hand, this fREF signal is further divided by 64 by Q12 and Q16, and supplied to the PCD (Pulse Count Discriminator) consisting of monostable multivibrator Q17, current switch Q18 and Q19, integrator C38 and C39, and differential amp Q21. A DC voltage proportional to the REF VCO frequency is generated here.

⑮ voltage is equal to the reference voltage supplied to pin ⑰ when a negative feedback loop is formed so that the REF VCO frequency is compensated by ⑮ voltage.

When the ⑳ voltage is 0 V and fRF is 17.4 MHz, the PCD output ⑮ becomes approximately +1.5 V. The reference voltage is set to this value. Since the negative feedback loop acts so that the PCD output voltage remains constant, fRF is controlled by the ㉑ voltage.

On the other hand, the voltage of ㉑ is applied to the VCO through R230 and R228 to lighten the load of Q22. Further, it is used to compensate the insufficient loop response through R78, R79, C60, and R9.

(4) YTF tuning circuit (YTFT)

Q89 and Q59 are the circuit which generates the signal (YTFT) which becomes the base of the YTF tuning voltage.

This signal is applied to the Z10 YTO/YTF DRIVER through J3-9. The YTF tuning current is made proportional to fRF (center frequency). The relationship among fRF, fLO (1st LO. frequency), and fIF (1st IF frequency) is given by the following equation:

$$fRF = N \times fLO \pm fIF$$

Since the voltage of LCLV is set proportionally to fLO, the output of the N multiple circuit (Q89-13) corresponds to N X fLO. By switching the fixed component corresponding to 2fIF by Q50, the YTFT voltage becomes N x fLO +0/-2 fIF. After this, the fixed voltage corresponding to fIF is added in the Z10 YTO/YTF DRIVER and this YTFT voltage is converted to be directly proportional to  $fRF = N \times fLO \pm fIF$

(5) 1.7 to 23 GHz gain compensation circuit

The 1.7 to 23 GHz band 1st MIXER Z6 is a harmonic mixer. The harmonic mixer conversion loss increases as the harmonic number increases. Thereupon, the increase component of this conversion loss must be compensated by switching the IF stage gain.

Actually, the IF AMP gain is switched by the two PIN diodes Q4 and Q7 on Z19  $\mu$  2nd CONVERTER 2. The constant current power supply that drives this is the two voltage-current conversion circuits consisting of Q65, Q66, and Q93. The voltage which is supplied to this voltage-current conversion circuit is switched according to the harmonic number. This role is played by the circuit consisting of Q64, Q57.

Furthermore, since the level of the radio-frequency (RF) signals generally decreases as the frequency rises because of the transmission line loss, this slope is compensated for by using the YTFT signal, which is a voltage almost directly proportional to the input frequency (RF). R175 and R174 are the reverse slope compensation circuit.

(6) 1.7 to 23 GHz mixer bias circuit

The optimum bias of the Z6 harmonic mixer differs according to harmonic number. The circuit which switches this bias according to the harmonic number is Q75 and Q76.

(7) Others

J9-1 to J9-8 pass through the DATA (DB0 to DB7) from the Z26 CPU board. This data is stored in a latch circuit and the latch output is supplied to the D/A converters and other circuits. LATCH is selected by the 1-of-8 decoder of Q79 and Q88.

## 5.9.2 Checking procedure - Z21

(1) Tuning Voltage Check (MT, FT, M/N VCO Tune, and YTOC)

Step	Procedure
1.	Press the 100 kHz to 2 GHz band selection switch. Then set the CENTER FREQ to 100 MHz and the span to 0 Hz. The $f_{LO}$ ( $f_{YTO}$ , Z9 1st Local Output frequency) will be 2621.4 MHz.

Step	Procedure
2.	<p>Confirm that the ❶ MT (Main Tune) voltage (<math>V_{MT}</math>, Q32-13) is 1.243 V. The following relationship exists between <math>V_{MT}</math> and <math>f_{LO}</math> which gives a sensitivity of 2 mV/MHz.</p> $V_{MT} = (f_{LO} \text{ (GHz)} - 2) \times 2 \text{ (V)}$
3.	<p>Confirm that the ❷ FT (Fine Tune) voltage (<math>V_{FT}</math>, Q42-1) value is 0 V. The <math>f_{FT}</math> is expressed by the following equations.</p> $f_{FT} = f_{LO} - (125 \times N + 2 \times M + 17.4) \text{ (MHz)}$ <p>At above settings N and M becomes 20 and 52 respectively (see Table 4-1), so <math>f_{FT}</math> becomes 0. And the following relationship exists between <math>V_{FT}</math> and <math>f_{FT}</math>, which gives a sensitivity of 2 mV/kHz.</p> $V_{FT} = f_{FT} \text{ (MHz)} \times 2 \text{ (V)}$
4.	<p>Confirm that the ❸ M/N VCO TUNE voltage (<math>V_{VCOT}</math>, Q72-1) is 2.5 V.</p> <p>The following relationship exists between <math>V_{VCOT}</math> and <math>f_{M/NVCO}</math>, which gives a sensitivity of 0.1 V/MHz.</p> $V_{VCOT} = (f_{M/NVCO} - 1017)/10$ <p>In the current panel setting, <math>f_{M/NVCO}</math> must be 1041.6 MHz.</p>
5.	<p>Check the ❹ YTOC voltage (Q40-1). This voltage is a compensating voltage for MT voltage and is normally within the range of -2.0 V to +2.0 V. The sensitivity is 0.1 V/MHz.</p>

(2) Sweep Voltage Check  
(Main Sweep, FM Sweep, and VCO Sweep)

Step	Procedure
1.	Set CENTER FREQ to 100 MHz and the span to 200 MHz/div
2.	Confirm that the ⑤ voltage (Q49-1) is as shown in Fig. 5-46 (1).
3.	Confirm that the three waveforms of ⑥ /Z21 Main Sweep signal at 200 MHz/div, ⑦ /Z21 FM Sweep signal at 2 MHz/div, and ⑧ /Z21 VCO Sweep signal at 100 kHz/div are the same as shown in Fig. 5-52 (2).  These three settings are the maximum settings for each sweep mode (MAIN Sweep, FM Sweep, and VCO Sweep). For example, if the span is 1 MHz/div, an FM Sweep signal ⑦ whose amplitude is cut in half of Fig. 5-52 (2) appears and the Main Sweep and VCO Sweep signals are zero.

(3) REF VCO Check

Step	Procedure
1.	Press the 100 kHz to 2 GHz band selection switch.  After resetting, set the CENTER FREQ to 100 MHz and the span to 100 kHz/div.
2.	Confirm that the ⑩ voltage waveform (Q22-1) is as shown in Fig. 5-53 (1).



(cont.)

Step	Procedure
3.	Confirm that the ⑮ voltage (Q22-6) coincides with the ⑯ voltage (Q22-5). About +1.5 VDC is the normal value.
4.	Confirm that the ⑰ voltage waveform (Q22-7) is as shown in Fig. 5-53 (1).
5.	Set the span to 0 MHz (other settings remain the same).
6.	If the frequency of the ⑱ signal (Q9-6) is 139.2 MHz and its amplitude is approx. 800 mVp-p, it is normal.
7.	If the frequency of the ⑲ signal (J1) is 17.4 MHz and its amplitude is a square wave of about 800 mVp-p, it is normal.
8.	If the ⑳ (Q17-6) and ㉑ (Q21-7) voltage waveforms are as shown in Fig. 5-53 (2), it is normal.

(4) Checking the YTF Tuning Voltage (YTFT) and 1.7 to 23 GHz Band Flatness Calibration Circuit

Press the 1.7 to 23 GHz band selection switch and reset the MS710[ ]. If the ㉒ (Q89-6), ㉓ (Q89-13), and ㉔ (Q66) voltage waveforms are as shown in Fig. 5-54, it is normal. The waveform of ㉕ (Q93) is similar to ㉔. The relationship between ㉒, ㉓ voltages and the Z5 YTF tuning frequency (CENTER FREQ) are -1 V/GHz and 0.2667 V/GHz respectively.

(5) 1.7 to 23 GHz Band Mixer Bias Generation Circuit

Press the 1.7 to 23 GHz band selection switch and reset the MS710[ ]. The ②1 voltage waveform will be as shown in Fig. 5-54.

5.9.3 Adjustment - Z21

(1) Tuning Voltage Adjustment

Adjust R85, R128 repeatedly to get ⑨ (Q89-6) voltage as follows.

Adj. Position	CENTER FREQ	SPAN	⑨ voltage (Q89-6)
R85 (Gain)	6.521 GHz	0	-5999.6 mV $\pm$ 1 mV
R128 (Offset)	1.978 GHz	0	-2499.4 mV $\pm$ 1 mV

(2) REF VCO Adjustment

Step	Procedure
1.	Ground the center of R71 and R72.
2.	Set CENTER FREQ 100 MHz, SPAN 0 MHz.
3.	Adjust the pitch of REF VCO coil L1 so that ⑩ (Q22-7) voltage becomes about -6.5 V ( $\pm$ 1 V).
4.	Adjust the spaces between L1 and L2 coils so that the level at ⑪ (Q9-6) becomes 800 mVp-p.

#### 17.4 MHz Frequency Adjustment:

Step	Procedure
5.	Adjust R91 so that Q42-1 voltage is at 0 V $\pm$ 1 mV.
6.	Set SPAN 1 kHz/div.
7.	Apply 100 MHz signal to the MS710[ ] RF INPUT connector.
8.	Adjust R61 so that the waveform comes to the center of the CRT.

#### SPAN and FT Adjustment:

Step	Procedure
9.	Set SPAN 100 kHz/div.
10.	Apply the 99.5 MHz and 100.5 MHz signal to the MS710[ ] RF INPUT connector, and adjust R66 so that SPAN becomes exactly equal to 1 MHz.
11.	Set SPAN 1 kHz/div.
12.	Apply the 101 MHz signal to the MS710[ ] RF INPUT connector and adjust R66 so that the waveform comes to the center of the CRT.
13.	Disconnect the wiring between the center of R71 and R72 and ground.

#### (4) YTFT Adjustment

Step	Procedure
1.	Memorize the output voltage at ⑩ (Q89-13) when setting to CENTER FREQ 5.479 GHz, SPAN 0 Hz.
2.	Adjust R143 so that the ⑩ voltage (Q89-13) at the time of setting to CENTER FREQ 5.478 GHz is equal to the voltage memorized previously ( $\pm 1$ mV).
3.	Set CENTER FREQ 3 GHz, SPAN 200 MHz/div, and SCALE 2 dB/div.
4.	Input a 3 GHz signal. Adjust the PRESELECTOR PEAK knob (on front panel) to get a maximum peak display of 3 GHz spectrum.
5.	Input a swept signal of 2 GHz to 4 GHz. Adjust the R126 so that the frequency-level characteristics of the CRT display become optimum.

#### (5) 1.7 to 23 GHz Band Flatness Adjustment

Input a RF signal, and adjust each frequency band gain as follows. Adjust the offset and gradient repeatedly.

FREQ BAND	Adj. Position
1st: 1.7 to 5.5 GHz	R165 (offset) R147 (gradient)
2nd: 5.5 to 12.5 GHz	R166 (offset) R149 (gradient)
3rd: 12.5 to 18.5 GHz	R167 (offset) R151 (gradient)
4th: 18.5 to 23 GHz	R168 (offset) R153 (gradient)

Moreover, R173 is for overall offset and R174 is for overall gradient.

(6) 1.7 to 23 GHz Band Mixer Bias Adjustment

(a) COARSE Adjustment:

Connect a digital voltmeter (DVM) to test point ②① (Q76-1) or ②② (Q76-6) and adjust R192, R193, R194, and R195 to get voltages as follow.

CENTER FREQ	3.5 GHz (1st)	9 GHz (2nd)	13 GHz (3rd)	21 GHz (4th)
Test Point	②①	②①	②②	②①
DVM	+9 V	+1 V	+0.5 V	+2 V
Adj. Position	R194	R192	R195	R193
(SPAN 2 MHz/div)				

Note: 1st (1.7 to 5.5 GHz)  
2nd (5.5 to 12.5 GHz)  
3rd (12.5 to 18.5 GHz)  
4th (18.5 to 23 GHz)

(b) FINE Adjustment:

Actually input the signals (3.5 GHz, 9 GHz, 13 GHz, and 21 GHz) and adjust the resistors (R194, R192, R195, and R193) so that the signal spectrum traces are maximized on the CRT at the same settings as COARSE Adjustment.

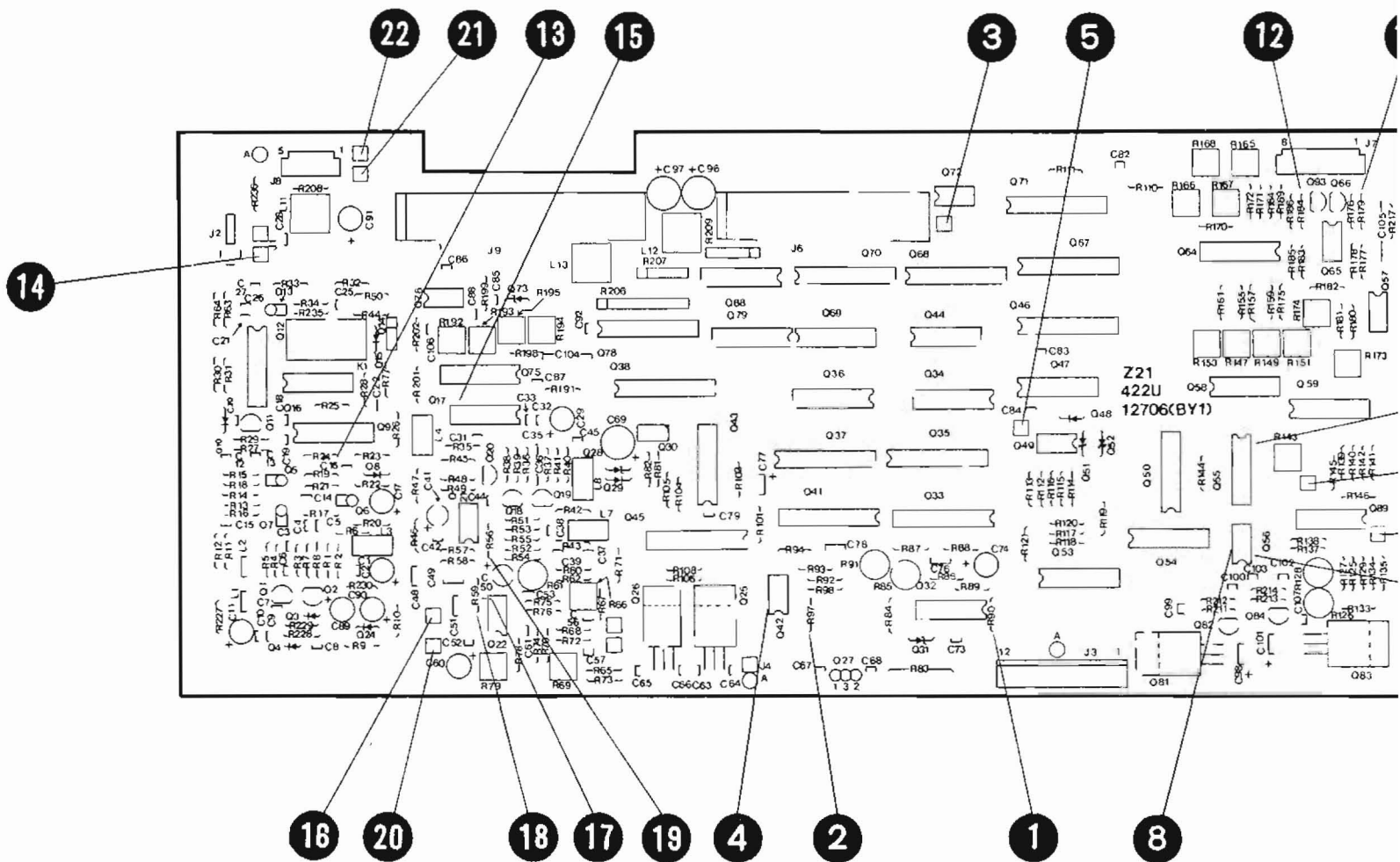
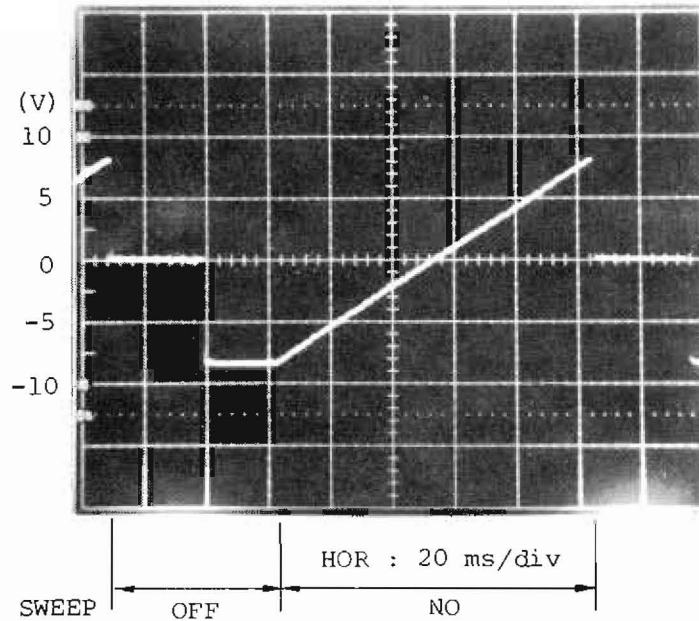


Fig. 5-51 Z21 1

5-117/(5-118 blank)

⑤ /Z21  
(Q49-1)  
at  
200 MHz/div



⑥ /Z21  
Main Sweep  
Q55-13,  
at 200 MHz/div

⑦ /Z21  
FM Sweep  
Q56-1,  
at 2 MHz/div

⑧ /Z21  
VCO Sweep  
Q56-7,  
at 100 kHz/div

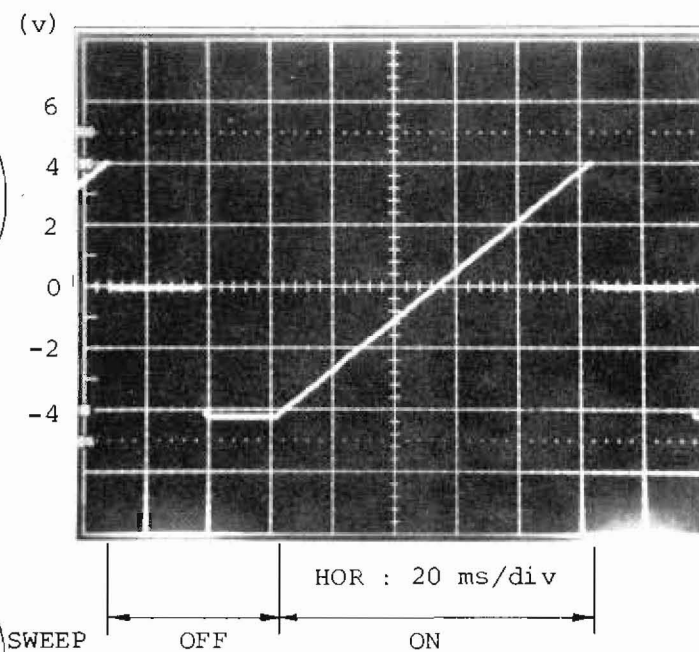
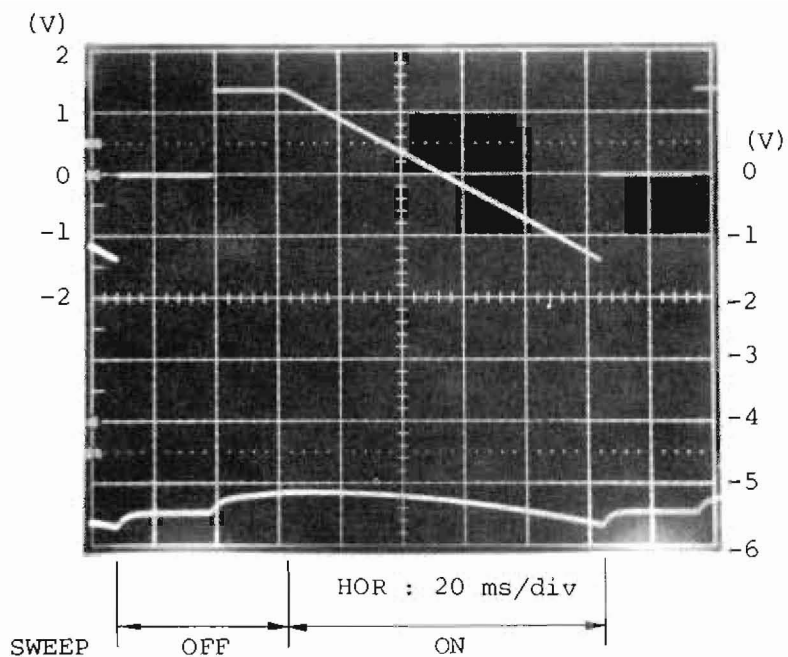


Fig. 5-52 Waveform of the Sweep Signals in Z21  
at CENTER FREQ 100 MHz



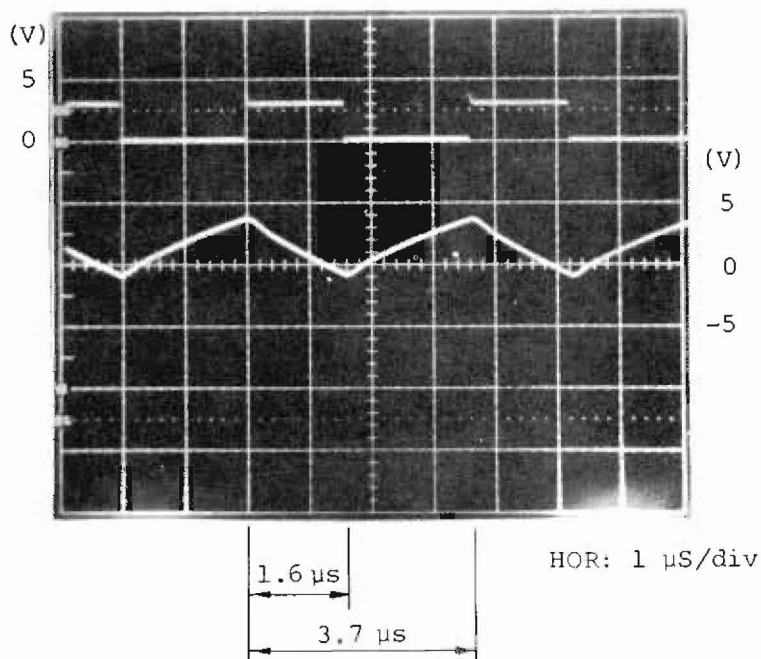
②① /Z21  
(Q22-1)



①⑥ /Z21  
(Q22-7)

(1) At CENTER FREQ 100 MHz, 100 kHz/div

①⑤ /Z21



①⑨ /Z21

(2) At CENTER FREQ 100 MHz, 0 MHz/div

Fig. 5-53 Waveforms of the Signals  
at the REF VCO Circuits in Z21

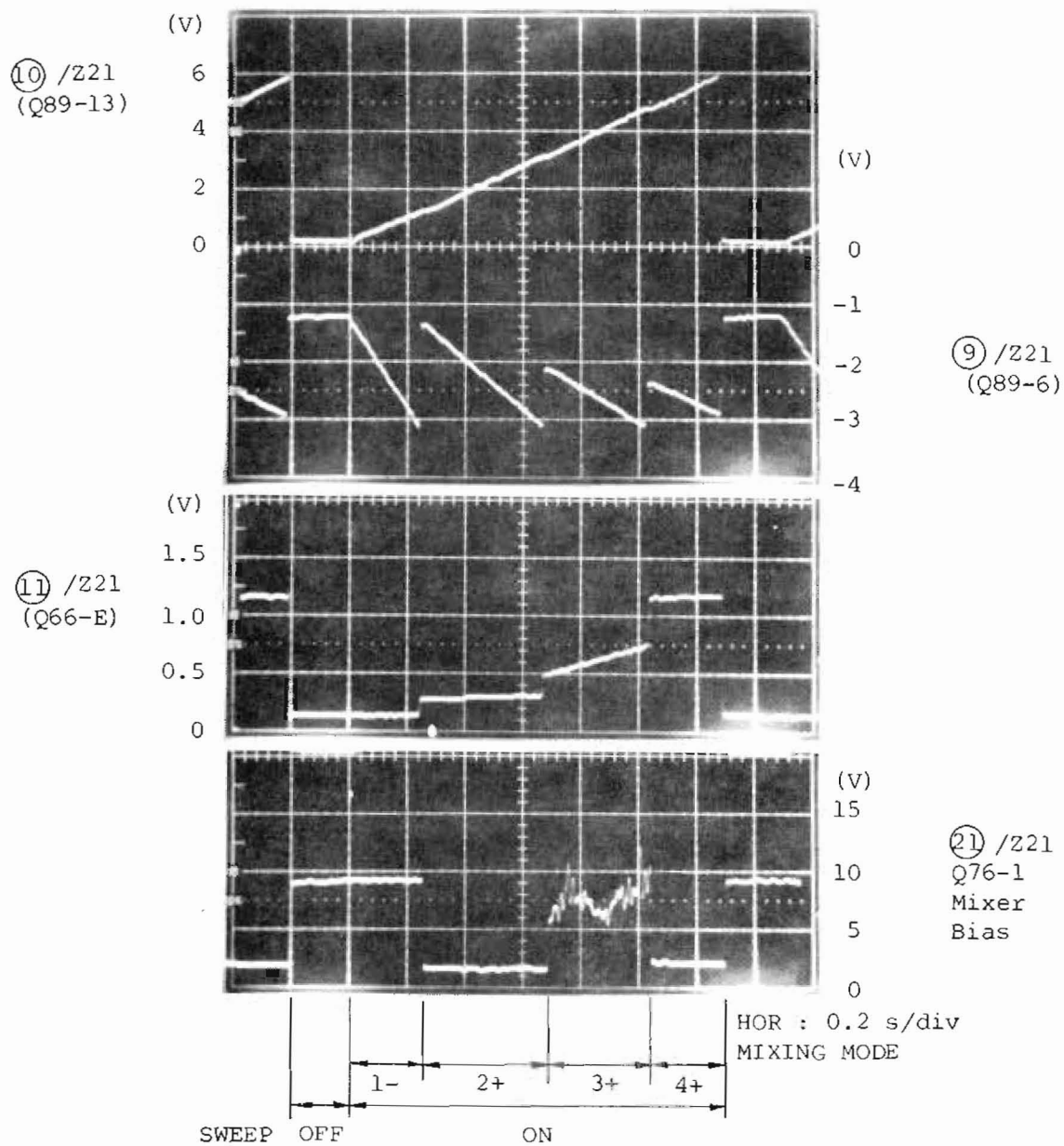
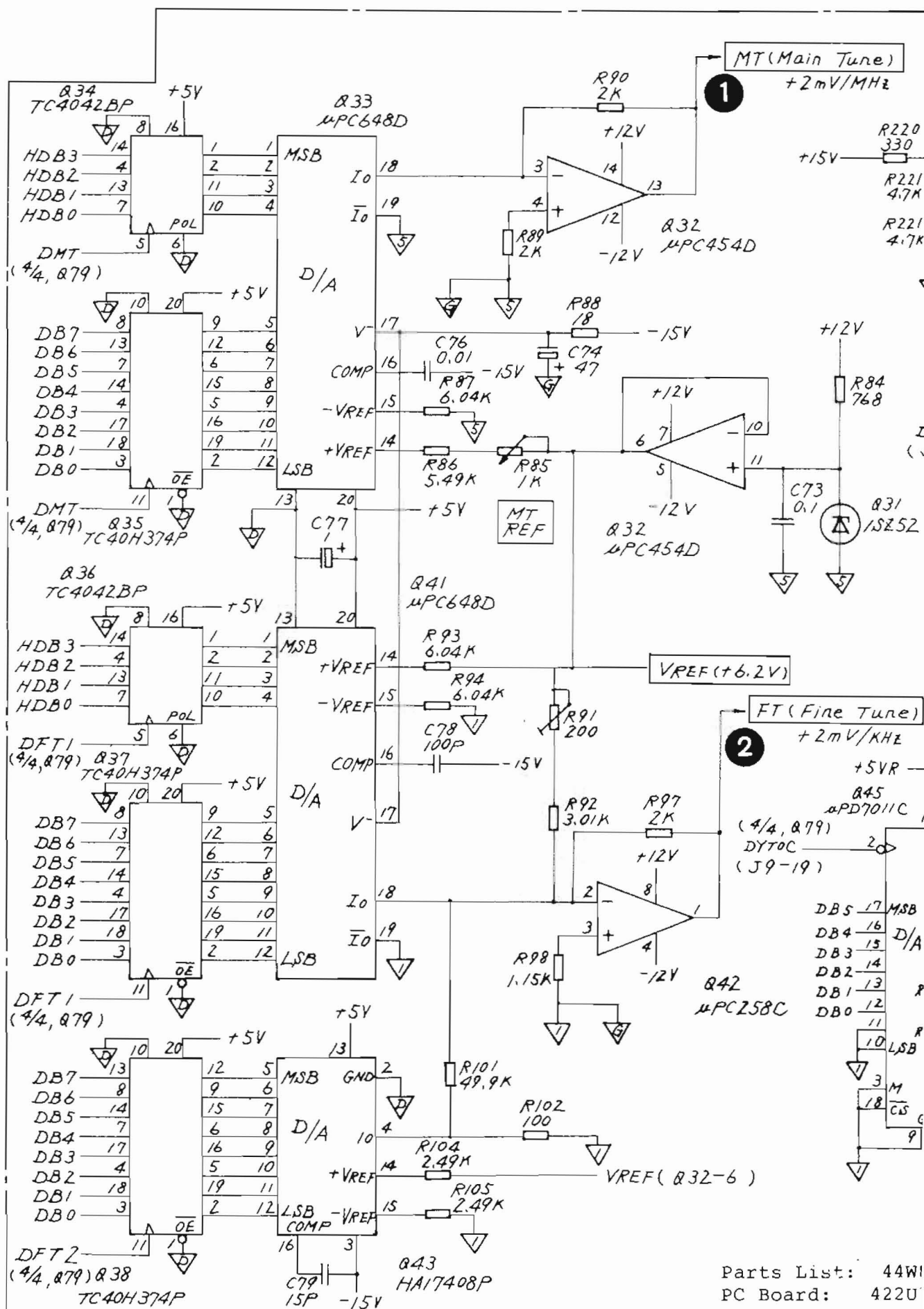


Fig. 5-54 Waveforms of the Signals in the 1.7 to 23 GHz Band



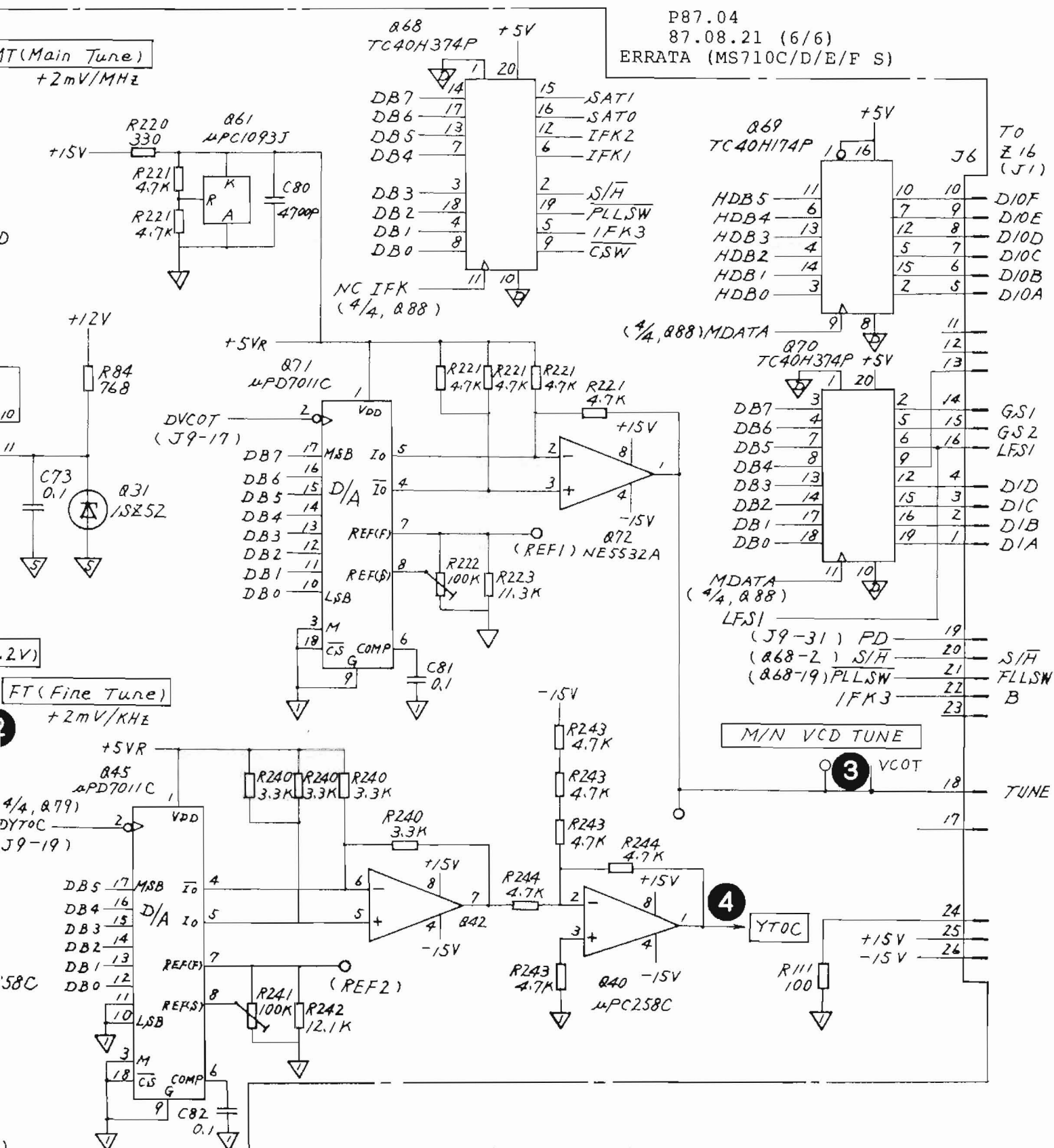
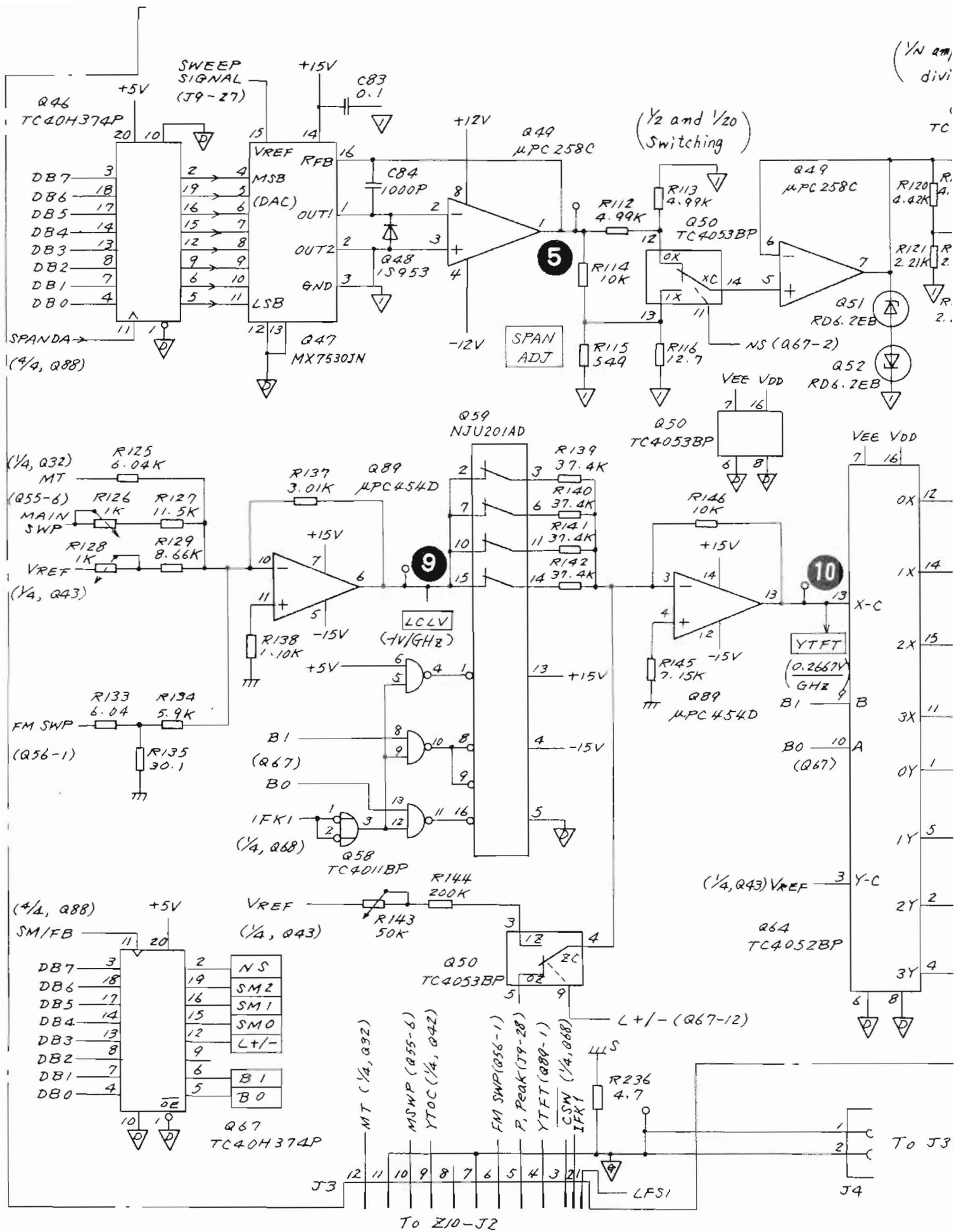
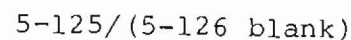


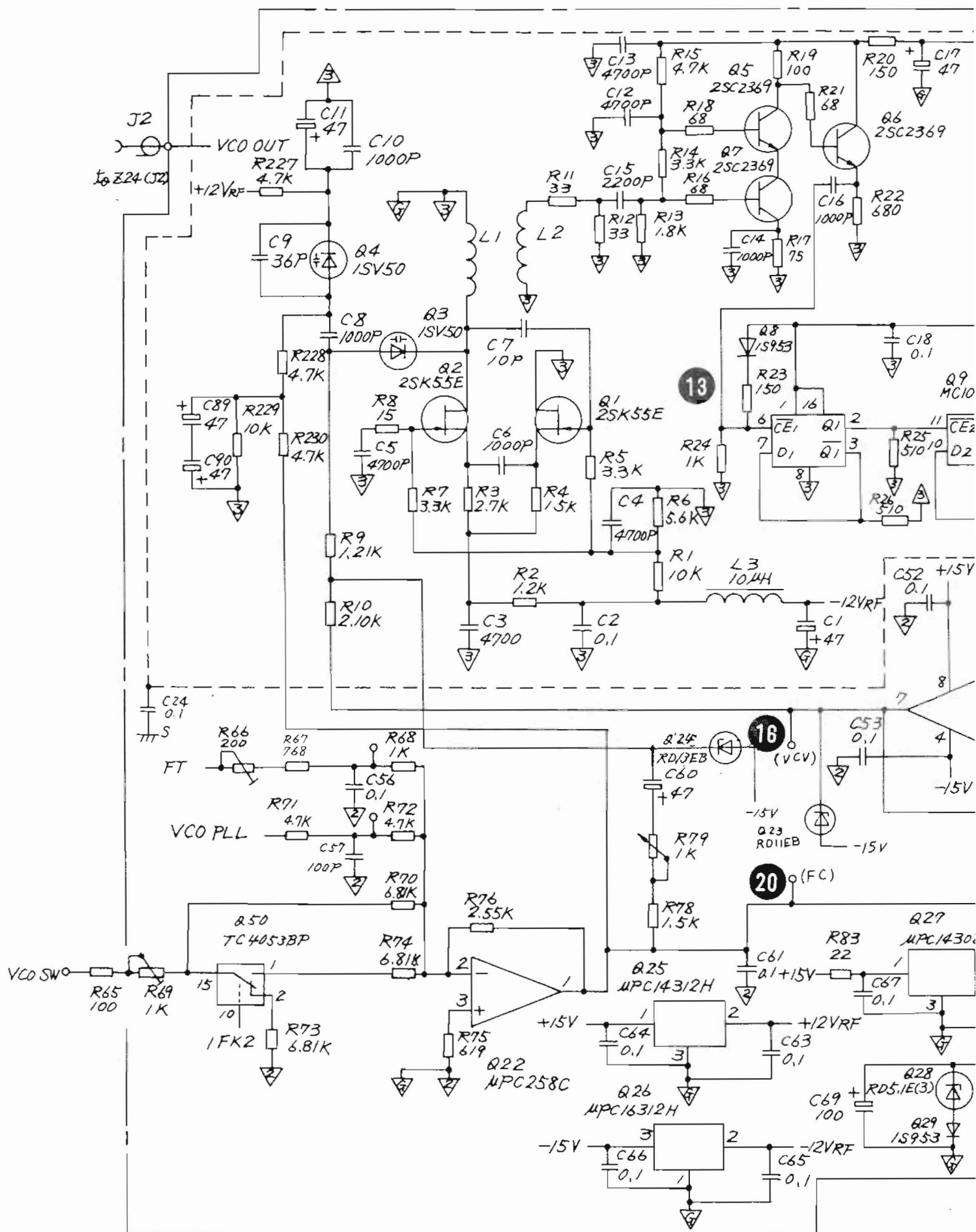
Fig. 5-55 (1/4)

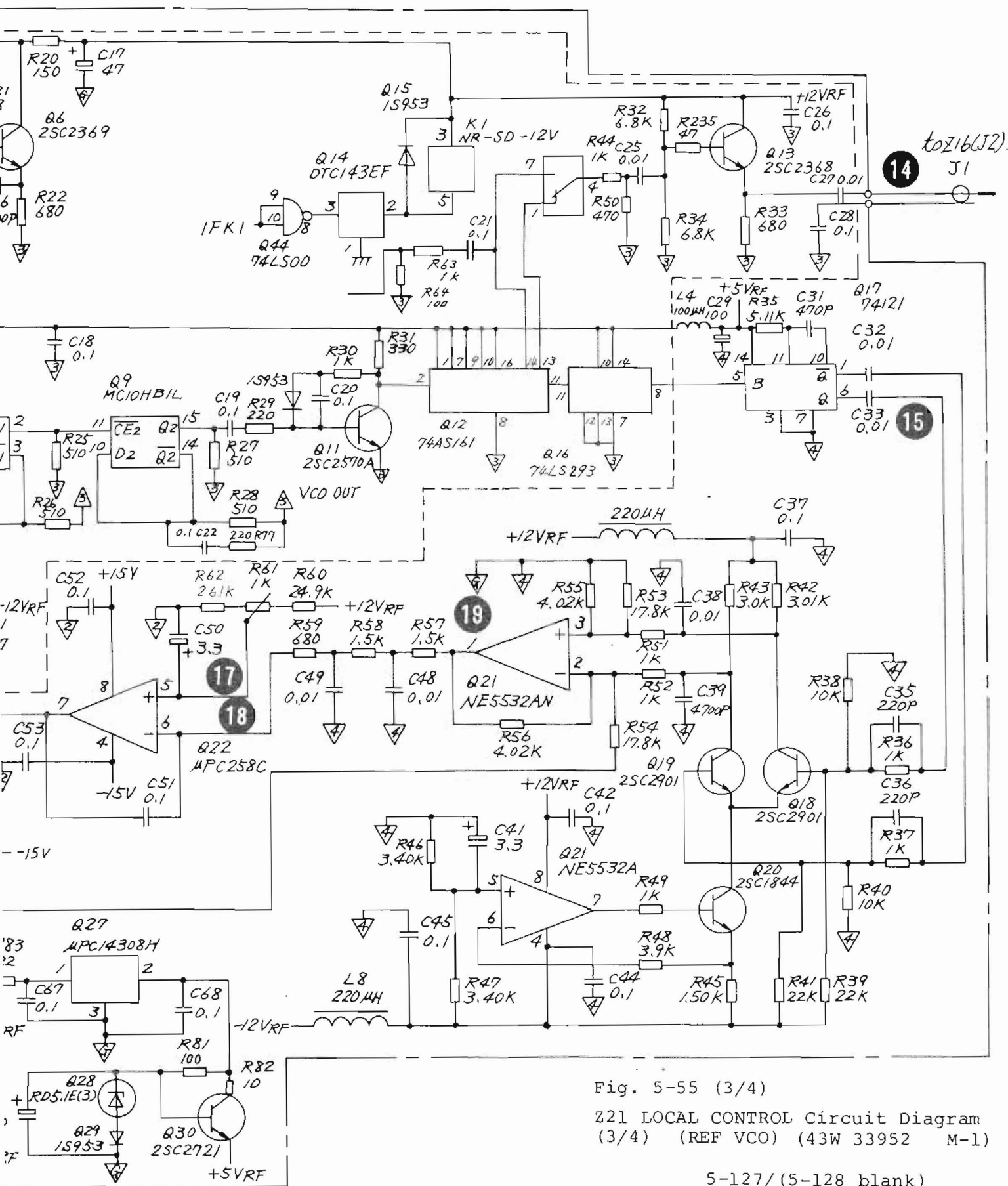
Z21 LOCAL CONTROL Circuit Diagram (1/4)  
(MT, VCO tune, and FT generation)  
(43W 33952) CORRECTED

Parts List: 44W83949  
Board: 422U12706



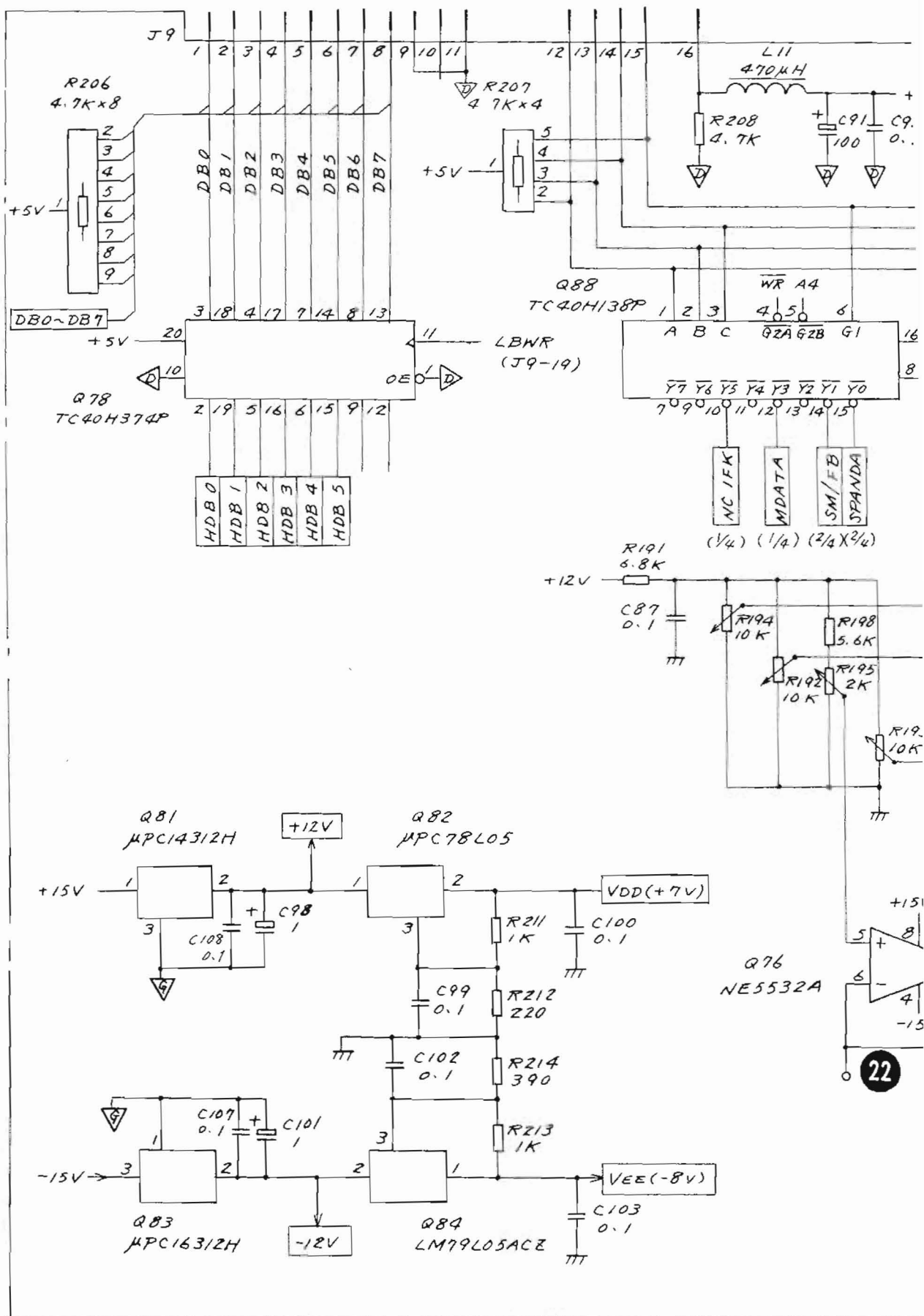








From Z22 (J4)



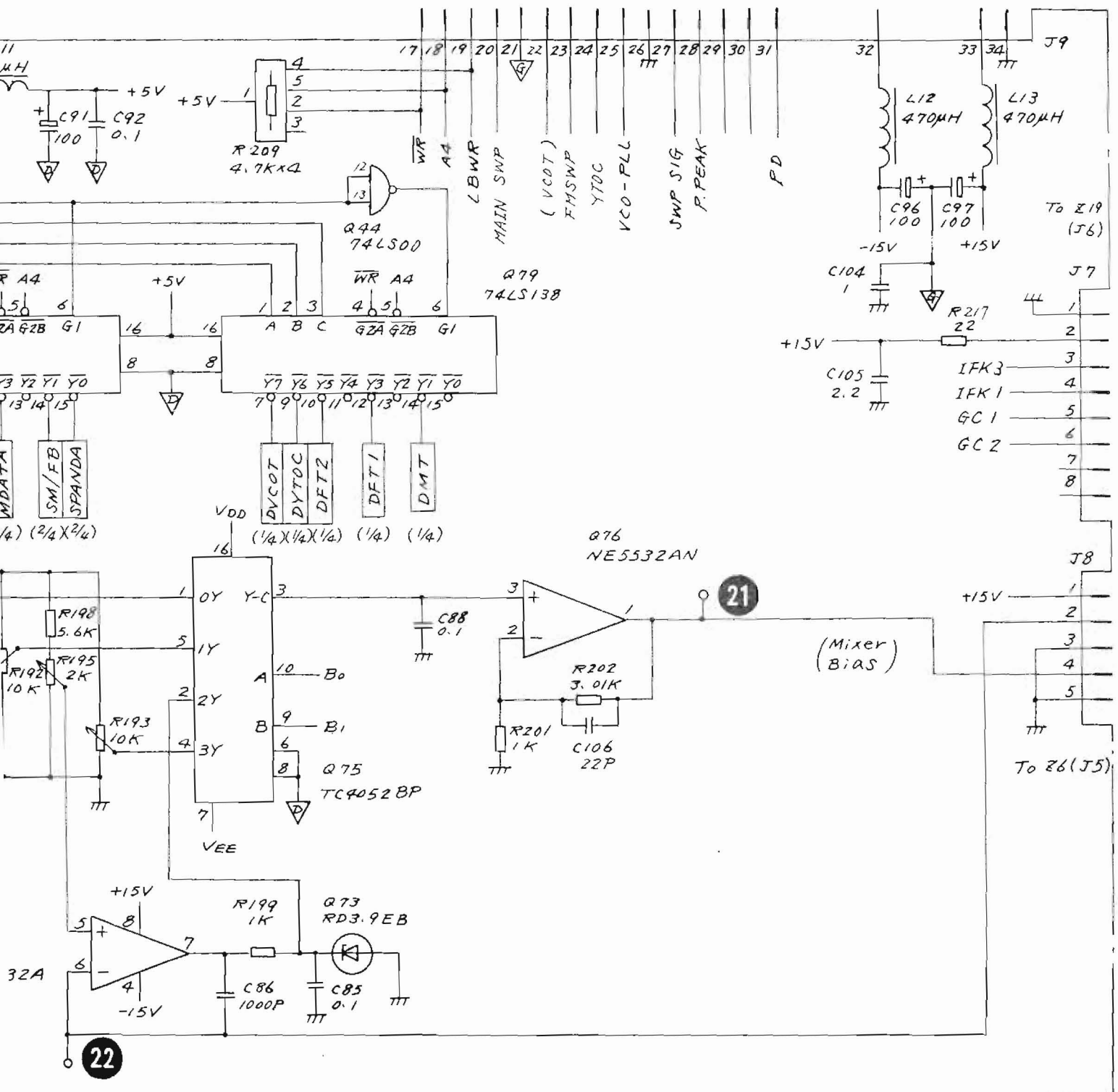


Fig. 5-55 (4/4)

221 LOCAL CONTROL Circuit Diagram  
(4/4) (Control and Mixer Bias  
signal generation) (43W 33952)

5-129/(5-130 blank)

## 5.10 Z22 IF BPF/AMP 1 and Z23 IF BPF/AMP 2

### 5.10.1 Circuit description - Z22 and Z23

(Refer to Fig. 3-3 (2/4), Figs. 5-58 and 5-60)

One set of two PC boards constitutes the IF section which determines the resolution bandwidth and reference level of the MS710[ ]. The 21.4 MHz IF signal selected by the IF switching circuit in the Z19  $\mu$  2nd converter 2 is input to the Z22 PC board through Z22-J1.

The Z22 and Z23 circuits are divided into the 9 parts (A) to (I) shown in Figs. 5-58 and 5-60, and the circuit description for each part is as follows:

#### Part (A): Level Cal. and Buffer

The input IF signal is passed through the LC LPF and is input to variable attenuator circuit Q3 and Q4. The bias current of PIN diodes Q3 and Q4 is controlled by the LEVEL CAL control on the front panel. The input IF signal is corrected to the standard level.

Then the signal is input to the 21.4 MHz BPF circuit through buffer amplifier Q5 and Q6.

#### Part (B): 21.4 MHz BPF

After the Q8 buffer amplifier, the IF signal applied to a 2-stage variable bandwidth BPF circuit. The center frequency of this circuit is 21.4 MHz. The bandwidth can be varied from 300 kHz to 3 MHz by using a variable R of PIN diodes (Q9, Q12).

The principle of the variable bandwidth BPF circuit is as follows.

A signal is applied to a high Q LC parallel resonant circuit through a variable resistance as shown in Fig. 5-56 and the voltage divided by this resistance component and the resonant circuit impedance is extracted by a high input impedance buffer amplifier.

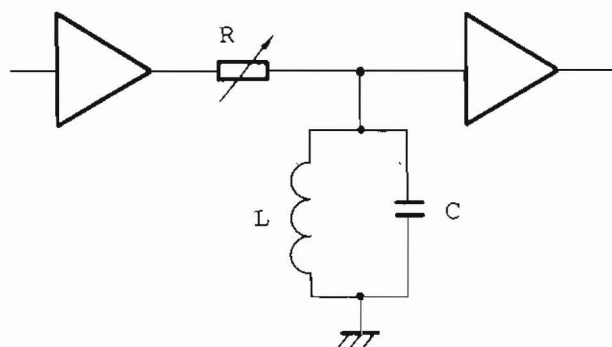


Fig. 5-56 Principles of the Variable BPF Circuit of 222  
(RBW: 300 kHz to 3 MHz)

If L and C are ideal or lossless, at the resonant frequency the impedance of the LC resonant circuit is infinite and the signal is transmitted without loss regardless of the value of R. The impedance of the resonant circuit decreases as the frequency moves away from the resonant frequency and the transmission loss is increased by division with R.

Therefore, as R becomes larger, a narrower bandwidth BPF characteristic is obtained and its bandwidth can be controlled by the value of R.

Describing the actual circuit by taking the initial stage circuit as an example, the value of R is set by PIN diode Q9 according to the RBW set value.

L is L11 and C is the parallel capacitance of C21, C22, and C23. The buffer amplifier is transistor Q11. Actually, since these elements are not ideal, when R is increased to obtain a very narrow bandwidth, the loss becomes large. To compensate for this, a part of the output signal is positively fed back by R19 and an increase in loss is prevented.

Part (C): IF Switch

K1 and K2 switch the IF signal path according to the resolution bandwidth (RBW) set value.

For RBW: 300 kHz to 3 MHz, they are turned OFF; for RBW: 100 Hz to 100 kHz, they are turned ON.

For RBW: 300 kHz to 3 MHz, the IF signal passes K1 and K2 and enters buffer amplifier Q57 directly.

Part (D): 1.5 MHz Down Converter

On the other hand, for RBW: 100 Hz to 100 kHz, the IF signal passed through K1 is passed through BEF (C49, C51, L15) and is mixed with the 19.9 MHz signal by Z2 MIXER and converted to a 1.5 MHz IF signal. The 1.5 MHz IF signal is sent to an amplifier Q101 through an LPF.

Part (E): 19.9 MHz LOCAL

Z1 is a crystal oscillator which generates the 19.9 MHz signal. Its output is amplified by Q26 and Q27, or Q28 and Q29, and is used as the local signal of the 21.4 MHz to 1.5 MHz, or 1.5 MHz to 21.4 MHz down (Z2) or up (Z3) converters, respectively. When one of the RBW of 300 kHz to 5 MHz is set, this 19.9 MHz signal is blocked by gate Q24 and is not applied to the MIXER of Z2 and Z3.

Part (F): 1.5 MHz BPF/AMP

This 1.5 MHz BPF circuit, which is a three-stage variable bandwidth BPF circuit, sets RBWs of 10, 30, and 100 kHz. The operation principle is the same as that described in Part (B). However, the fixed resistor is switched by the diode switch instead of using the PIN diode as a variable resistor.

After the IF signal has passed the BPF circuit, it is sent to the crystal BPF in Z23 via the programmable gain amplifier consisting of Q43 and Q51.

Part (G): 21.4 MHz Step Gain Amplifier/BPF

The 21.4 MHz IF signal from K2 is output to J3 through a 2-stage amplifier whose gain is controlled in 10 dB steps, an amplifier whose gain is controlled in 0.1 dB steps, and a 3-stage BW 300 kHz to 3 MHz variable BPF circuit the same as in Part (B). The signal is then sent to the following Z25 LOG/LIN AMP/DETECTOR PC board through J3.

Part (H): Gain and BW Controls

Z22 contains address decoder Q92 and latches Q89, Q90, and Q91 for receiving the various logic control signals from the Z26 CPU board; it also contains a circuit for converting the received logic control signals to the actual BPF bandwidth control and the amplifier gain control signals.

Part (I): 1.5 MHz CRYSTAL BPF (Z23 IF BPF/AMP 2)

This four-stage variable bandwidth crystal BPF circuit sets RBWs of 100 Hz to 3 kHz.

It also contains the circuit which compensates the IF gain variation due to the RBW change and the programmable gain amplifier circuit to switch the IF gain.

#### 5.10.2 Checking procedure - Z22 and Z23

Step	Procedure
1.	Remove the top cover and the PC board cover plate (15) . See Fig. 2-1 and 2-5.
2.	Measure the output level at the Z22-J3 by using another spectrum analyzer or a power meter that can receive 21.4 MHz. This output level at the Z22-J3 is referred to as "level 1" afterward.
3.	Remove the Z19-J4 cable connected to the Z22-J1 and input a 21.4 MHz, -20 dBm signal to the Z22-J1 from a signal generator.
4.	Set the MS710[ ] as follows:  CENTER FREQUENCY    100 MHz REFERENCE LEVEL      0 dBm RESOLUTION BW        3 MHz INPUT ATT             10 dB
5.	Fully turn the front panel LEVEL CAL adjustment variable resistor and confirm that "level 1" can be varied from approximately -18 dBm to -6 dBm (approximately -12 $\pm$ 6 dBm). If it is not varied, there is a fault in Part (A), (B), (C), (G), or (H).

(cont.)

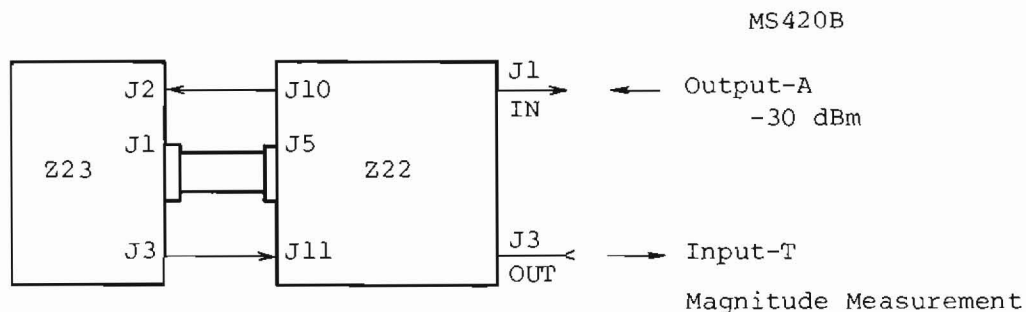
Step	Procedure
6.	Fix the LEVEL CAL adjustment variable resistor to the center and set the resolution BW to 100 kHz.
7.	Finely adjust the frequency of the signal generator by approximately 100 kHz around 21.4 MHz and fix the frequency to the point where "level 1" indicates the maximum level.
8.	In this case, when "level 1" is $-12 \pm 2$ dBm, it is normal. If the level is abnormal, there is a fault or faulty BPF adjustment (center frequency shift) in the 1.5 MHz IF CIRCUITS Part (C), (D), (E), (F), (H), or in the Z23 IF BPF/AMP 2 section.
9.	Reducing the output level of the signal generator to -30, -40, -50, and -60 dBm in steps of 10 dB, vary the MS710C reference level to -10, -20, -30, and -40 dBm corresponding to the above signal generator level and confirm that "level 1" is always set to the level in step (8). If not, the two 10 dB step gain amplifiers of the 1.5 MHz IF circuit is faulty.
10.	Reset the output level of the signal generator to -20 dBm, the MS710[ ] reference level to 0 dBm, and the Resolution BW to 3 MHz.
11.	Measure the output level at the Z23-J3 (level 1) by using another spectrum analyzer (21.4 MHz) or a power meter. When the output is $-12 \pm 2$ dBm, it is normal.



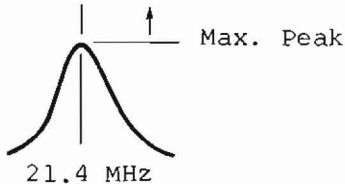
Step	Procedure
12.	Vary the output level of the signal generator to -30, -40, -50, and -60 dBm and the MS710[ ] reference level to -10, -20, -30, and -40 dBm and confirm that "level 1" is always maintained. If not, the Z23 21.4 MHz 10 dB step gain amplifier is faulty.
13.	Varying the MS710[ ] reference level to -61, -62, ..., and -69 dBm in steps of 1 dB using the data knob, confirm that "level 1" increases in steps of 1 dB.
14.	Connect the Z22-J3 to the Z25-J1 and Z19-J4 to Z22-J1 as previously connected and change the MS710[ ] setting as follows:  REFERENCE LEVEL    -20 dBm SPAN                1 MHz/div SCALE               1 dB/div
15.	Connect the output of the signal generator to the MS710[ ] RF INPUT connector. Set the signal generator frequency to 100 MHz. Finely adjust the output level of the signal generator to -20 dBm and by changing the Resolution BW, check that the RBW (-6 dB bandwidth) varies correctly.  If there is an abnormality, check the control voltage of each checkpoint shown in the Z22 and Z23 circuit diagrams Figs. 5-58 and 5-59. In this case, remove the Z22 and Z23 by pulling it up and use the service kit extender cable for the detailed analysis of these packages.

### 5.10.3 Adjustment - Z22 and Z23

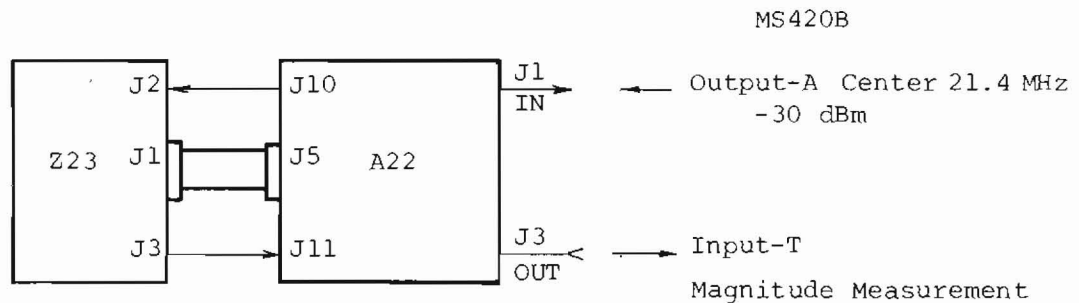
#### (1) Z22 and Z23 IF BPF/AMP Adjustment



Step	Procedure
1.	Adjust the voltage at checkpoint ❶ (Fig. 5-58 (5/6)) to +7.5 V with R211.
2.	Set the controls as follows: <div style="margin-left: 40px;">MS710[ ] ... RBW 300 kHz</div> <div style="margin-left: 40px;">MS420B ..... Output-A, center 21.410 MHz, Span 1 MHz</div> Adjust C23, C33, C179, C190 and C202 (Fig. 5-58 (1/6, 4/6)) to get max. peak level at the center of the MS420B display.
3.	Set the controls as follows: <div style="margin-left: 40px;">MS710[ ] ... RBW 30 kHz</div> <div style="margin-left: 40px;">MS420B ..... Center 21.400 MHz, Span 100 kHz</div> Adjust C84, C94, C104 (Fig. 5-58 (3/6)) to get max. peak level at the center of the MS420B display.

Step	Procedure
4.	<p>Set the controls as follows:</p> <p>MS710[ ] ... RBW 1 kHz</p> <p>MS420B ..... Center 21.400 MHz, Span 3 kHz</p>  <p>Tune C12, L3, C30, L4, C44, L5, C57, and L7 (Fig. 5-59 (1/2, 2/2)) to get max. peak level at the center of the MS420B display.</p>

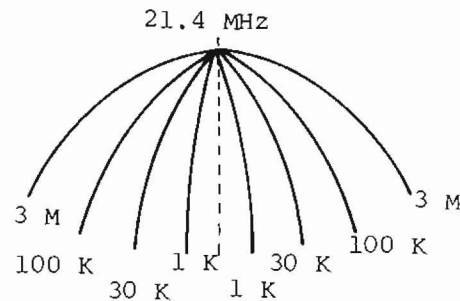
(2) RBW Gain Deviation and IF Gain Adjustment



(a) RBW gain deviation

Adjust the level of 21.4 MHz at RBW=300 kHz, 100 kHz, 10 kHz, 3 kHz, 1 kHz, 300 Hz, and 100 Hz equal to the level of 21.4 MHz at RBW=3 MHz.

Adj. Position	RBW
Fig. 5-58 (4/6) : R203	300 kHz
Fig. 5-58 (3/6) : R294	100 kHz
Fig. 5-60 (2/2) : R122	10 kHz
Fig. 5-60 (2/2) : R133	3 kHz
Fig. 5-60 (2/2) : R135	1 kHz
Fig. 5-60 (2/2) : R134	300 Hz
Fig. 5-60 (2/2) : R136	100 Hz



(b) IF Gain

Step	Procedure				
1.	Set the controls as follows: MS710[ ] ... RBW 3 MHz, INPUT ATTEN MANUAL 10 dB REF 0 dBm				
2.	Change the REFERENCE LEVEL from 0 to -9 dBm in 1 dB steps, and check that MS420B shows the same step level change to the reverse direction (Error $\leq \pm 0.2$ dB).  When the REFERENCE LEVEL is decreased, the level shown by the MS420B should be increased.				
	<table> <tr> <th>Adj. Position</th><th>1 dB/div. Steps</th></tr> <tr> <td>R286</td><td>0 to 9 dB</td></tr> </table>	Adj. Position	1 dB/div. Steps	R286	0 to 9 dB
Adj. Position	1 dB/div. Steps				
R286	0 to 9 dB				
	(Refer to Fig. 5-58 (5/6))				

(cont.)

Step	Procedure
------	-----------

3. Change the REFERENCE LEVEL from 0 to -40 dBm in 10 dB steps, and check that the MS420B shows the same level change to the reverse direction (Error  $\leq \pm 0.2$  dB).

Adj. Position	REFERENCE LEVEL
R237	-10 dB
R238	-20 dB
R247	-30 dB
R248	-40 dB

(Refer to Fig. 5-58 (6/6))

Also check at RBW 30 kHz of MS710[ ].

Adj. Position	REFERENCE LEVEL
R136	-30 dB

(Refer to Fig. 5-58 (3/6))

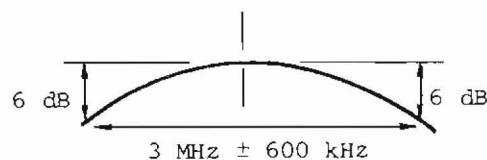
- (c) RBW  $\pm 20\%$ :

Check the RBW as follows.

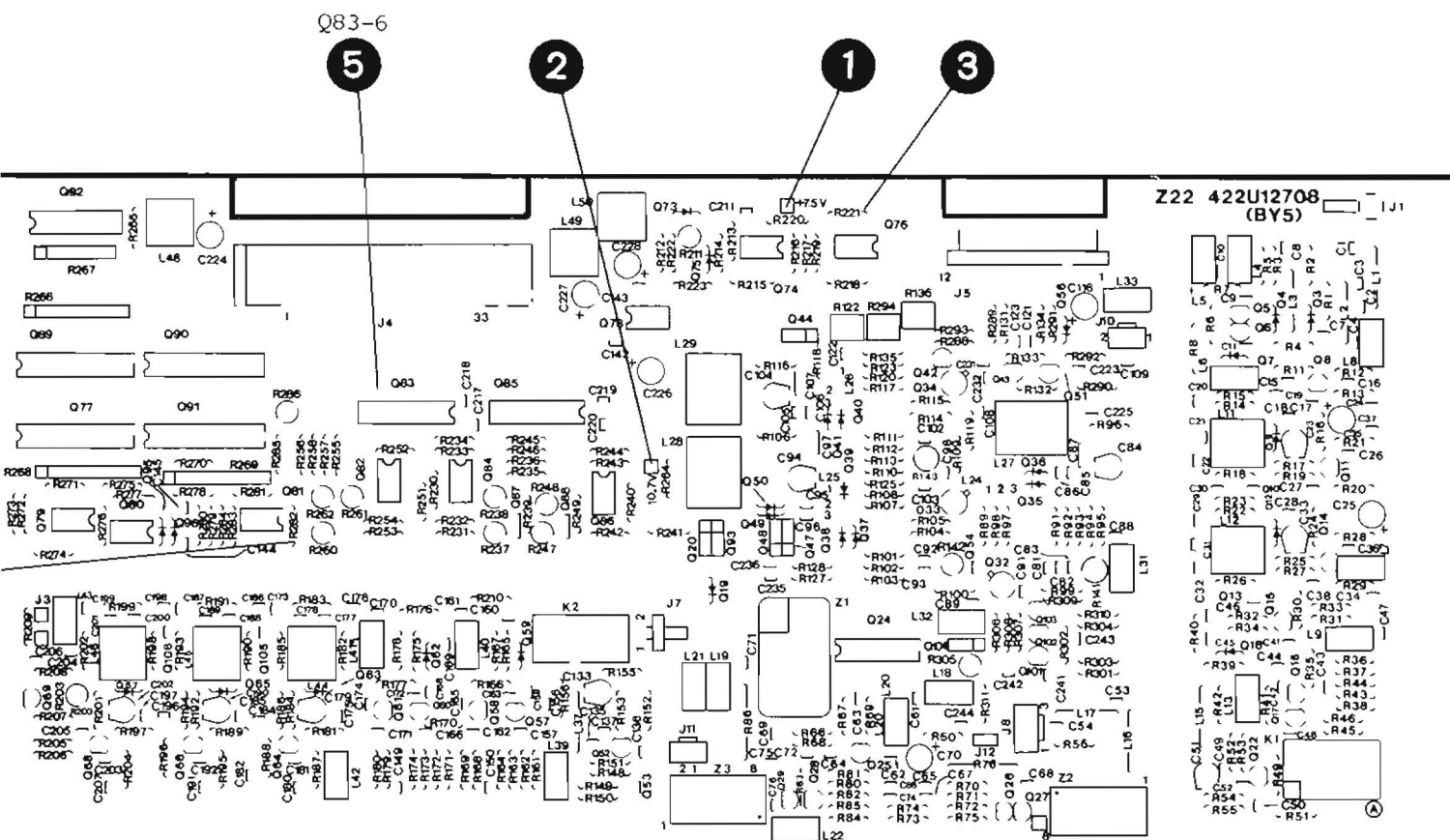
Settings of MS420B		Adjustment of MS710[ ]	
CENTER FREQ	SPAN	Adj. Position	RBW
21.4 MHz	5 MHz	R262	3 MHz $\pm 600$ kHz
21.4 MHz	2 MHz	R261	1 MHz $\pm 200$ kHz
21.4 MHz	0.5 MHz	R260	300 kHz $\pm 60$ kHz

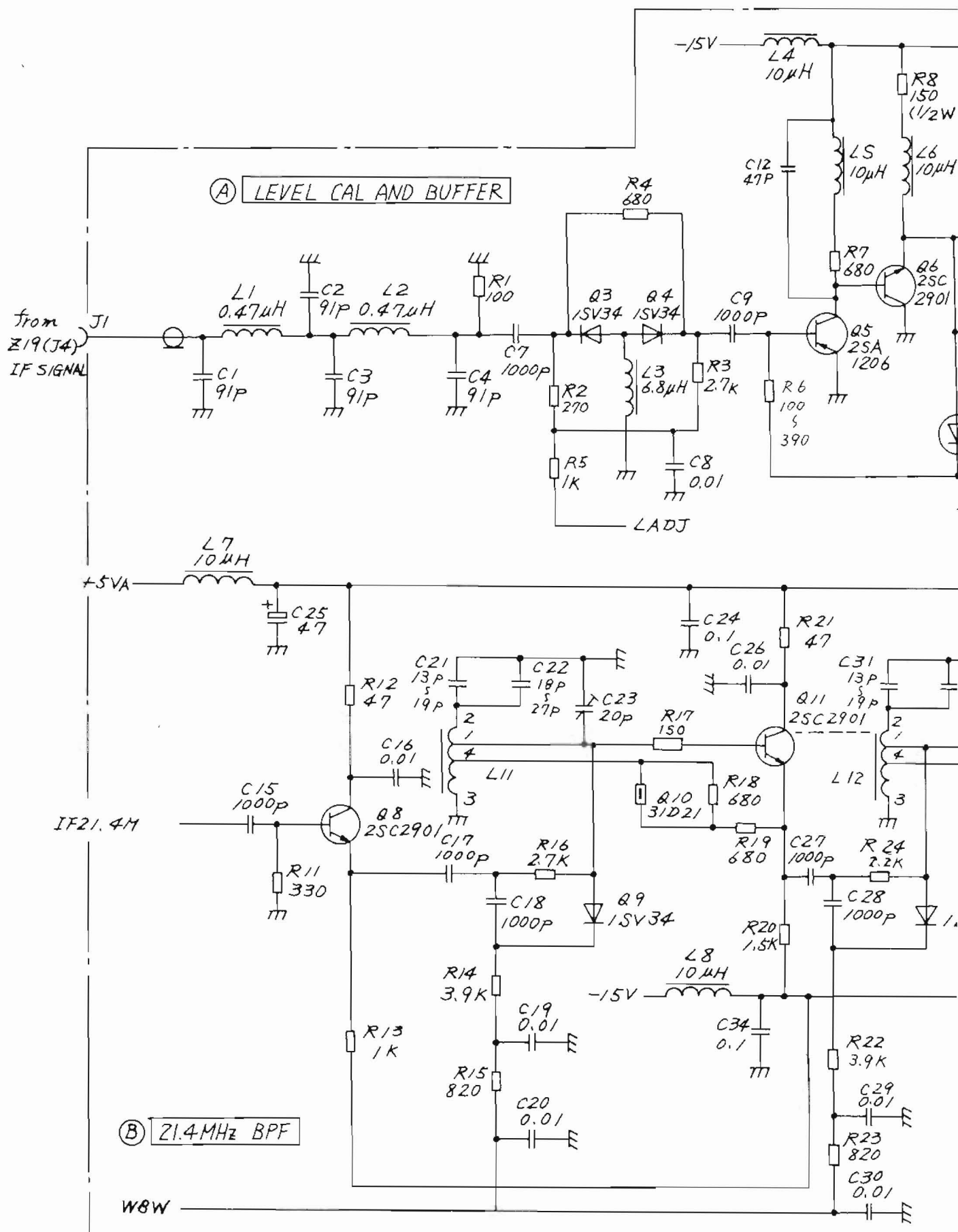
(Refer to Fig. 5-58 (6/6))

An example in case of RBW = 3 MHz is shown below.

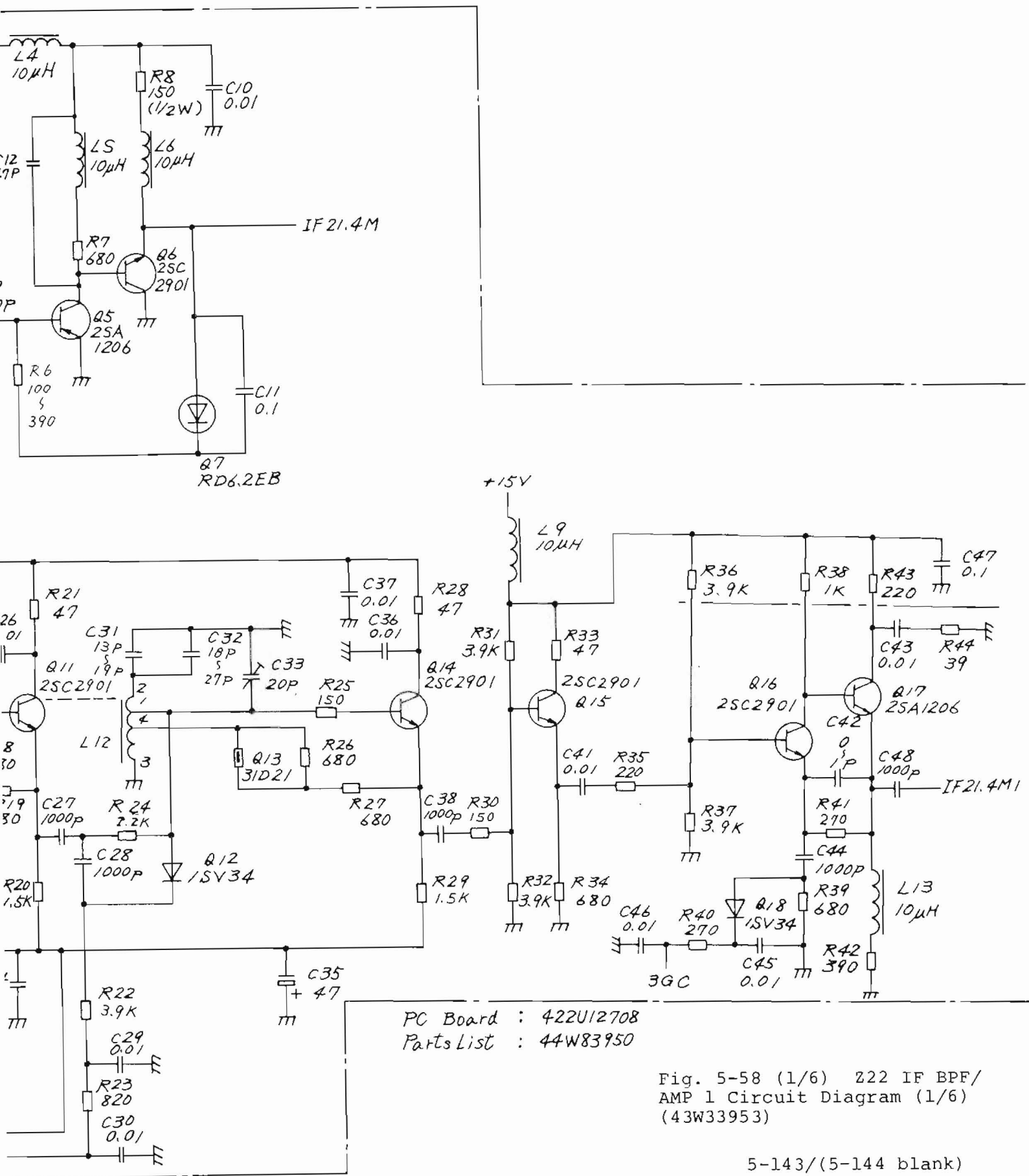


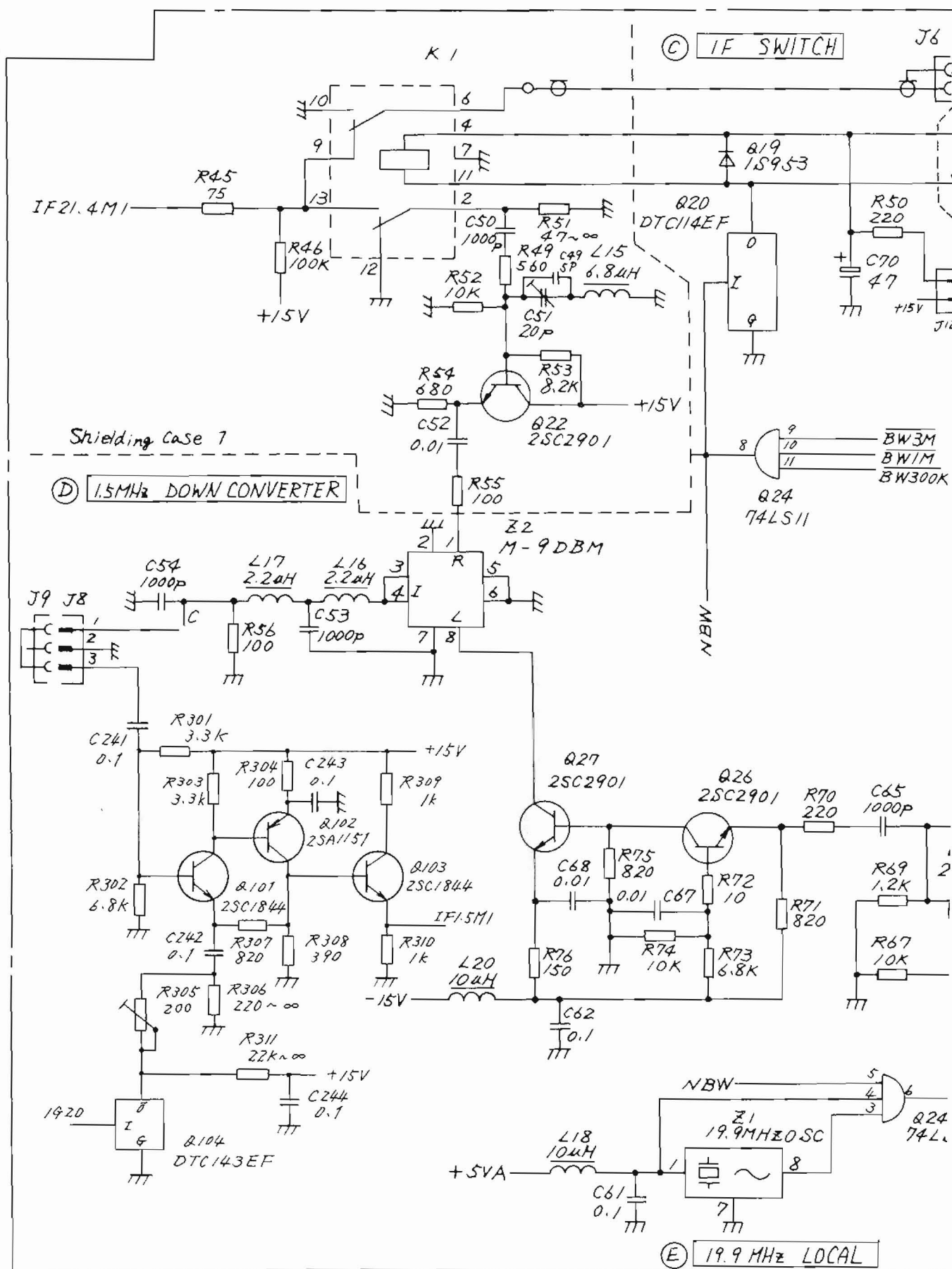












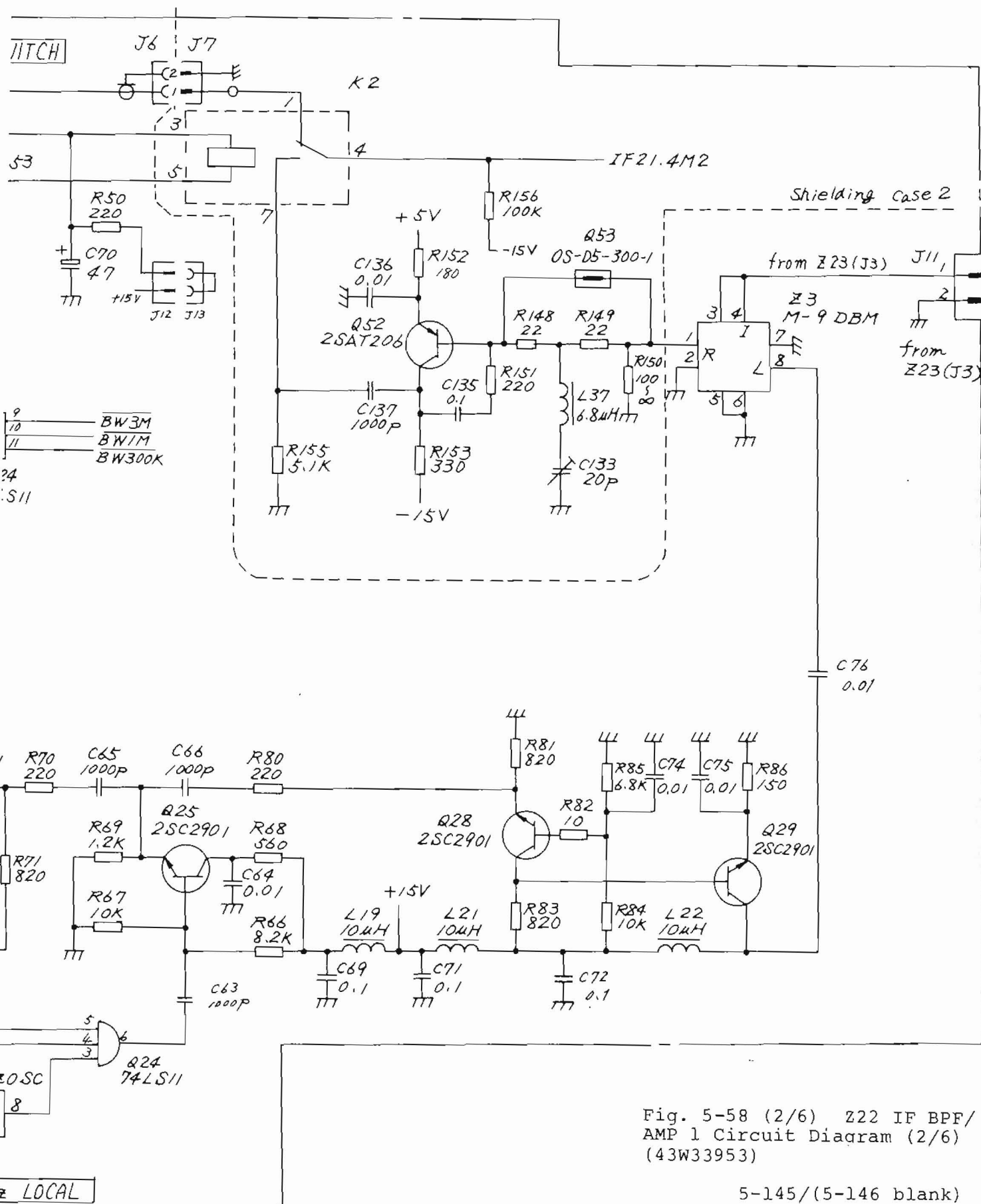


Fig. 5-58 (2/6) Z22 IF BPF/  
AMP 1 Circuit Diagram (2/6)  
(43W33953)

5-145/(5-146 blank)



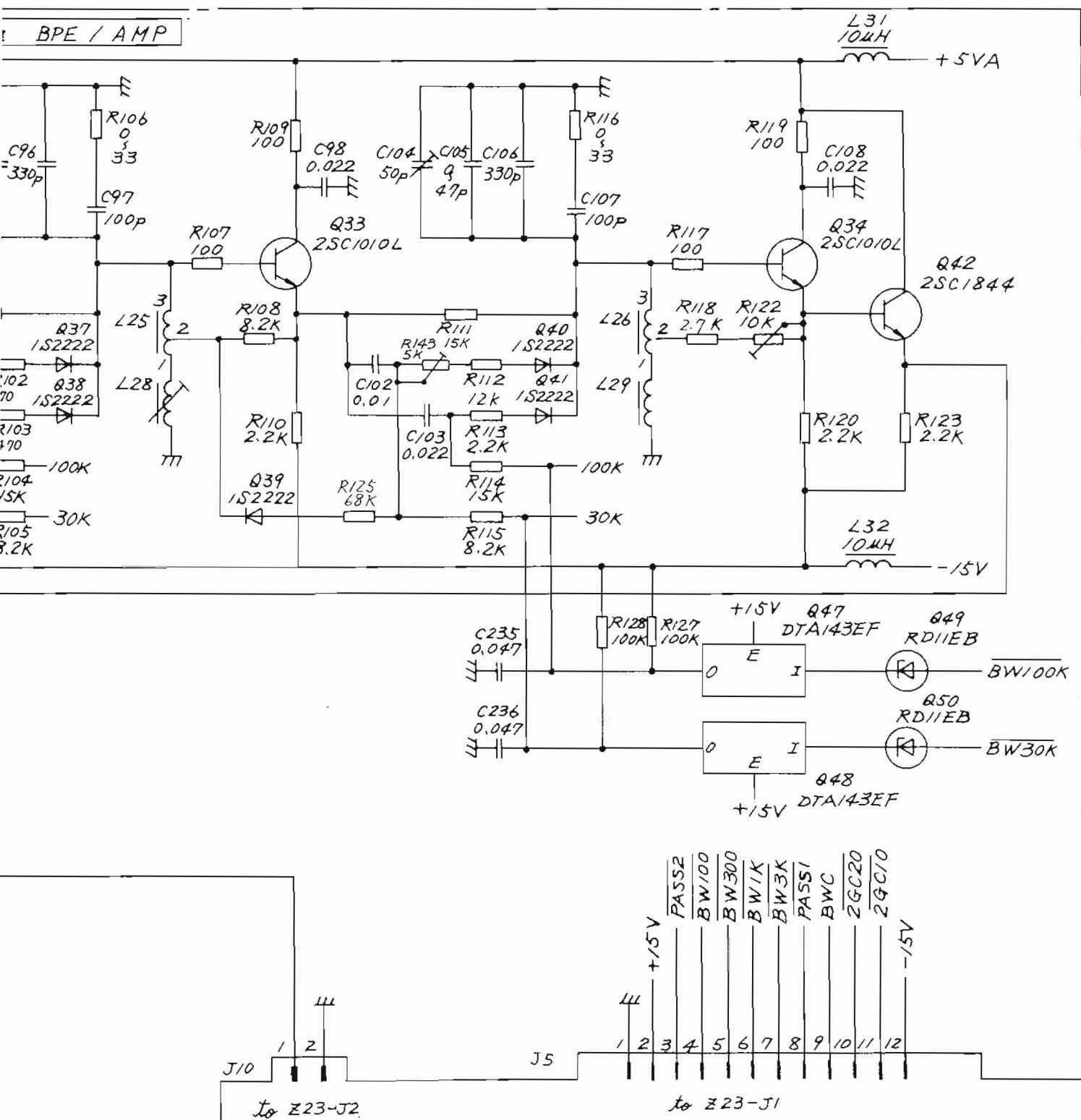
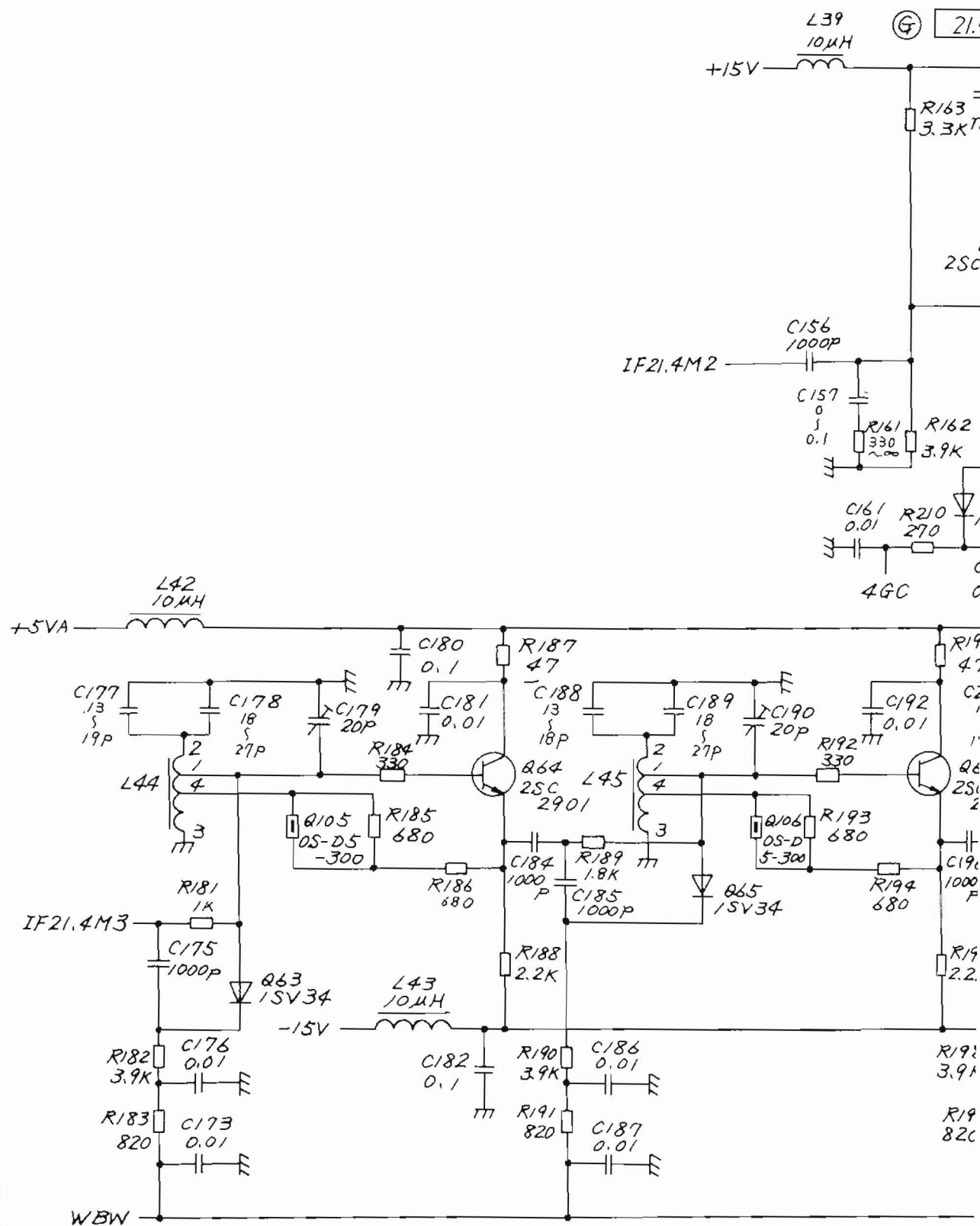


Fig. 5-58 (3/6) Z22 IF BPF/  
AMP 1 Circuit Diagram (3/6)  
(43W33953)

5-147/(5-148 blank)





# MHz STEP GAIN AMPLIFIER BPF

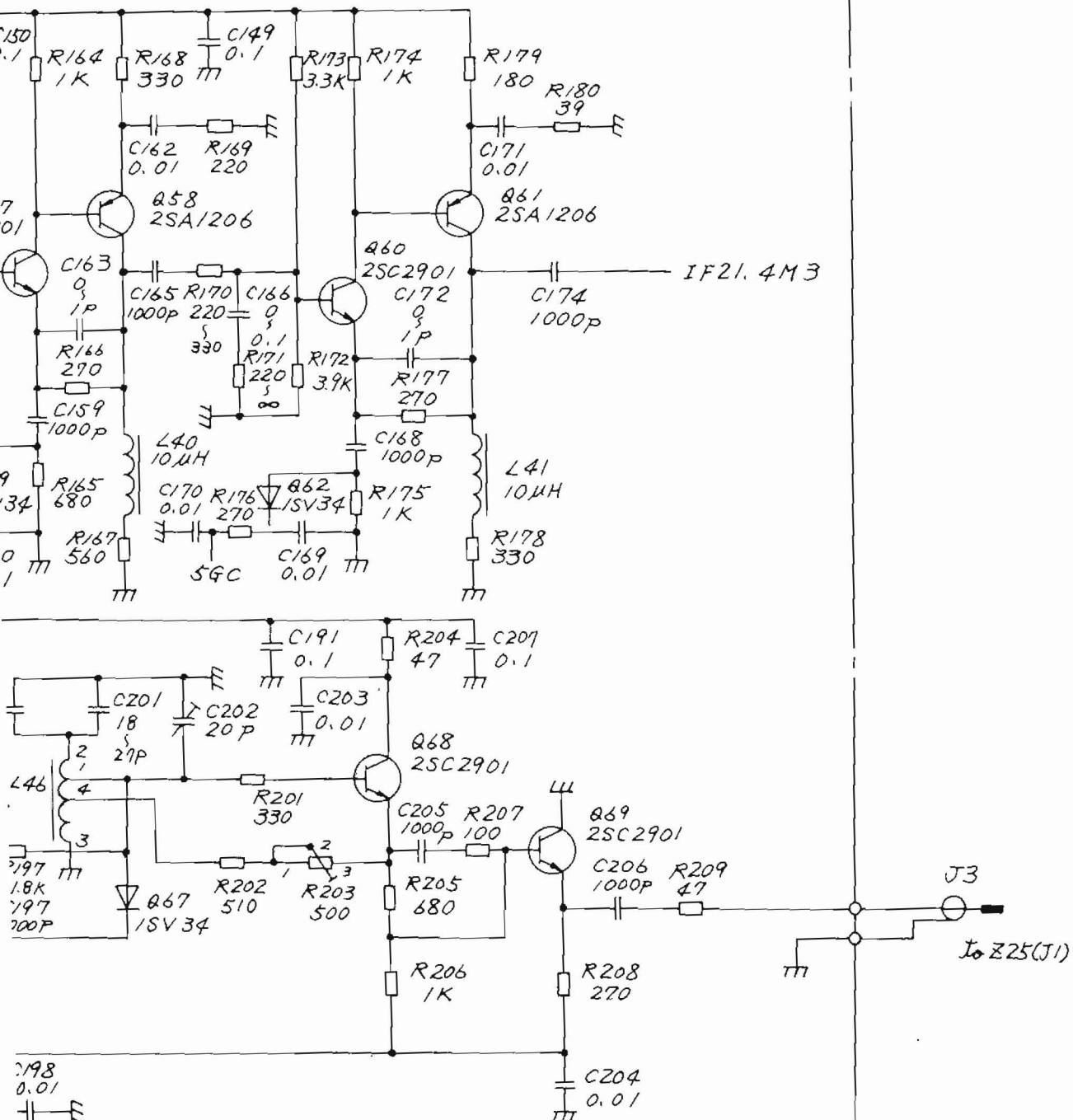
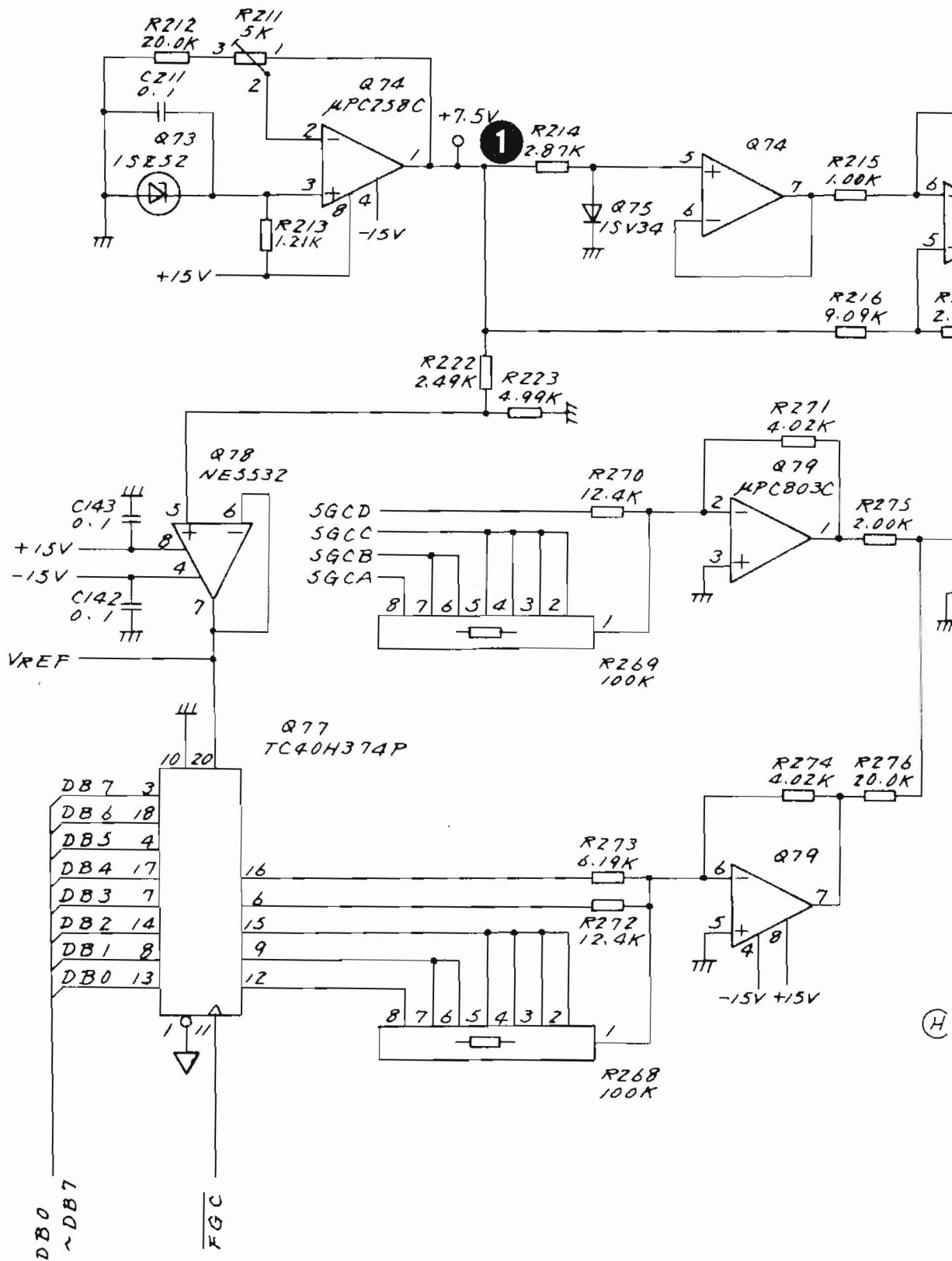
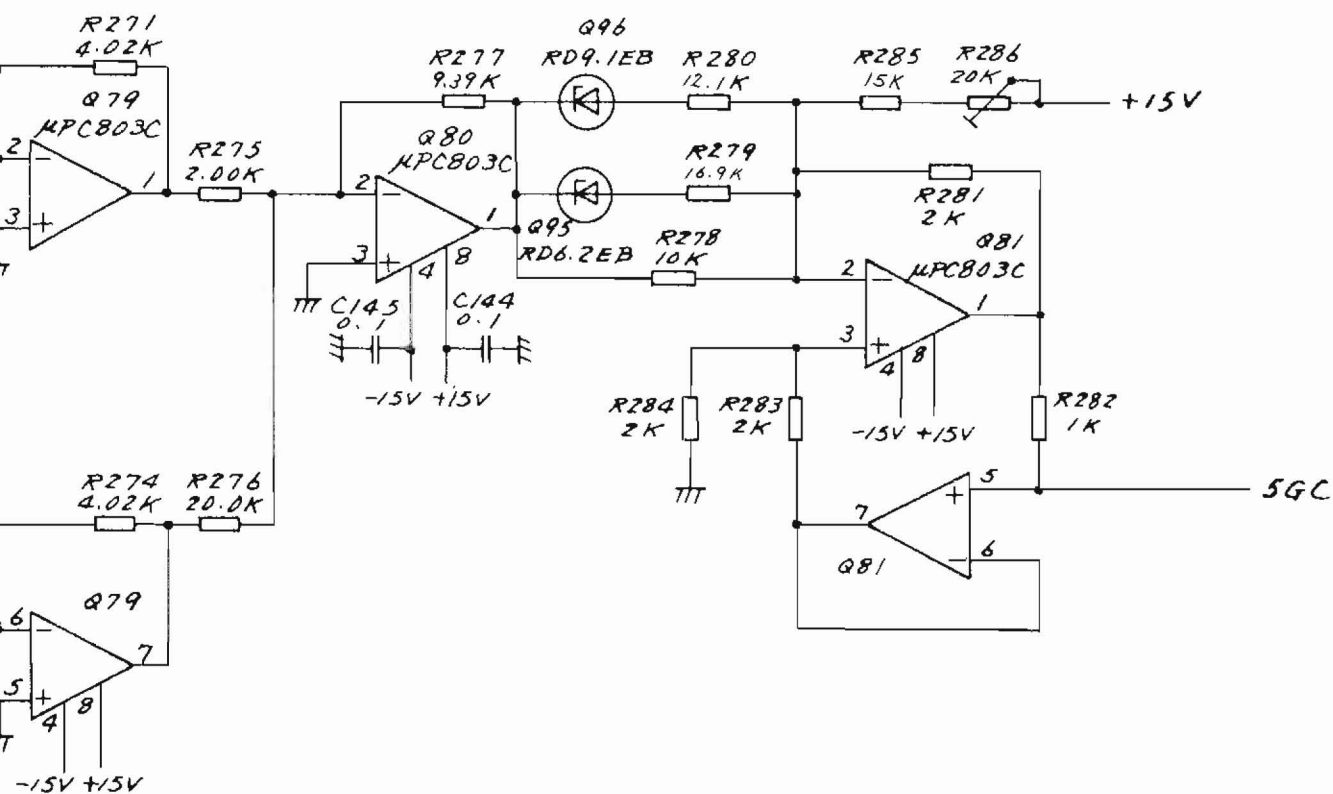
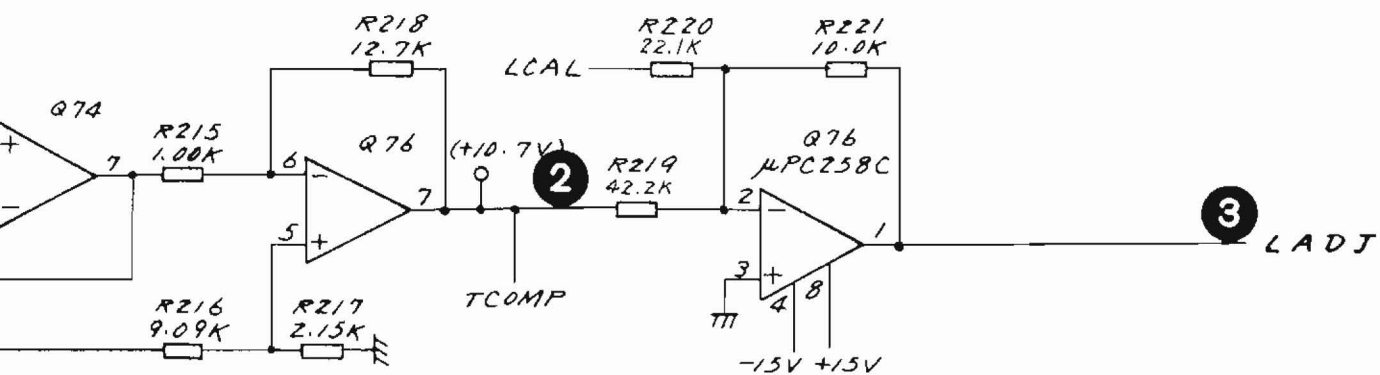


Fig. 5-58 (4/6) Z22 IF BPF/  
AMP 1 Circuit Diagram (4/6)  
(43W33953)

5-149/(5-150 blank)



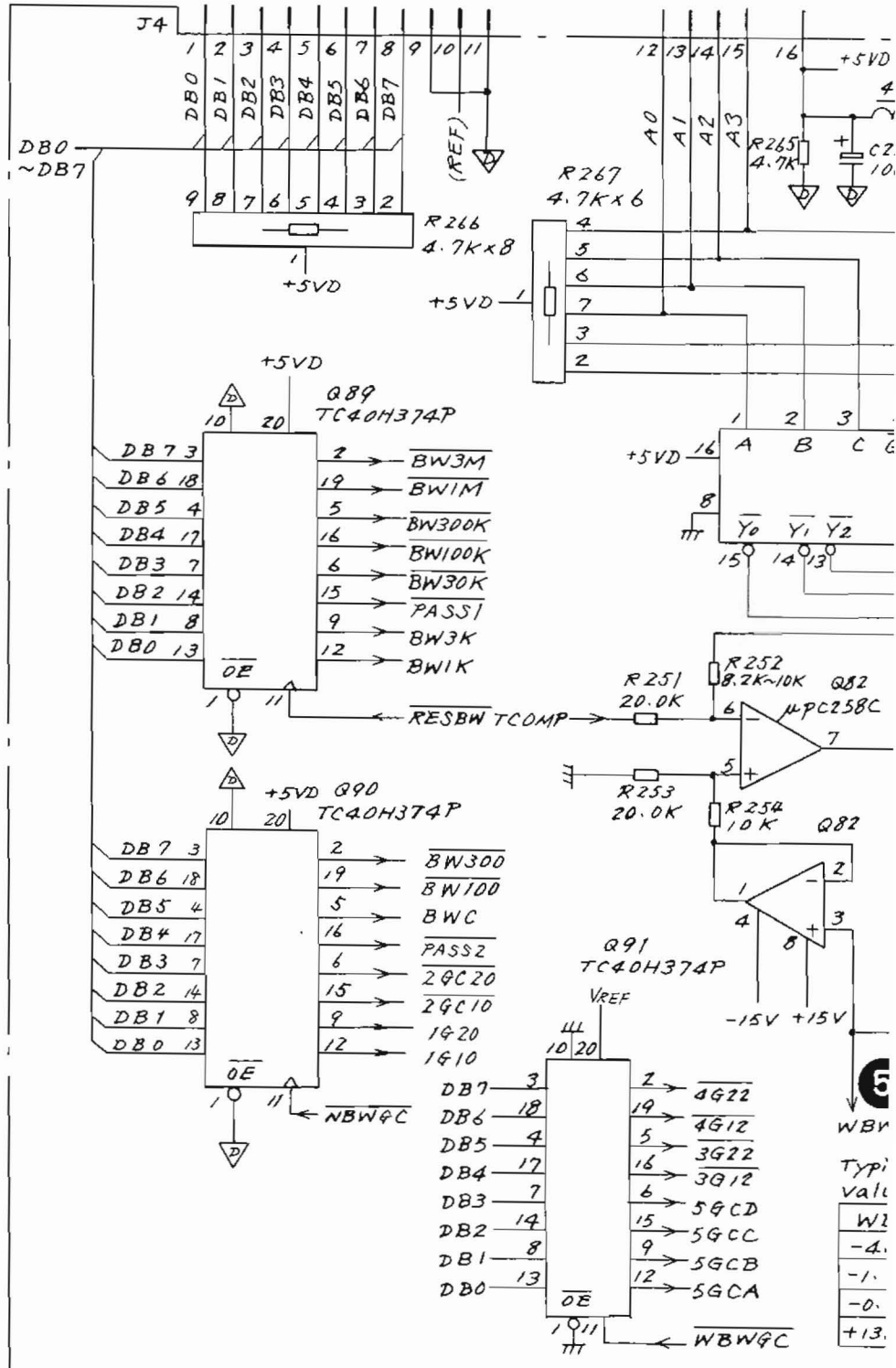




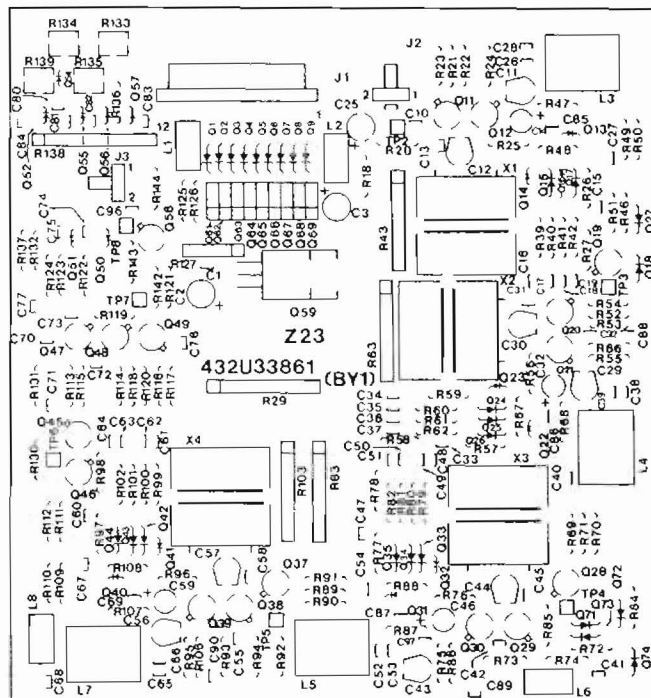
(H) GAIN AND BW CONTROLS - (1/2)

Fig. 5-58 (5/6) Z22 IF BPF/  
AMP 1 Circuit Diagram (5/6)  
(43W33953)

From 826-J4



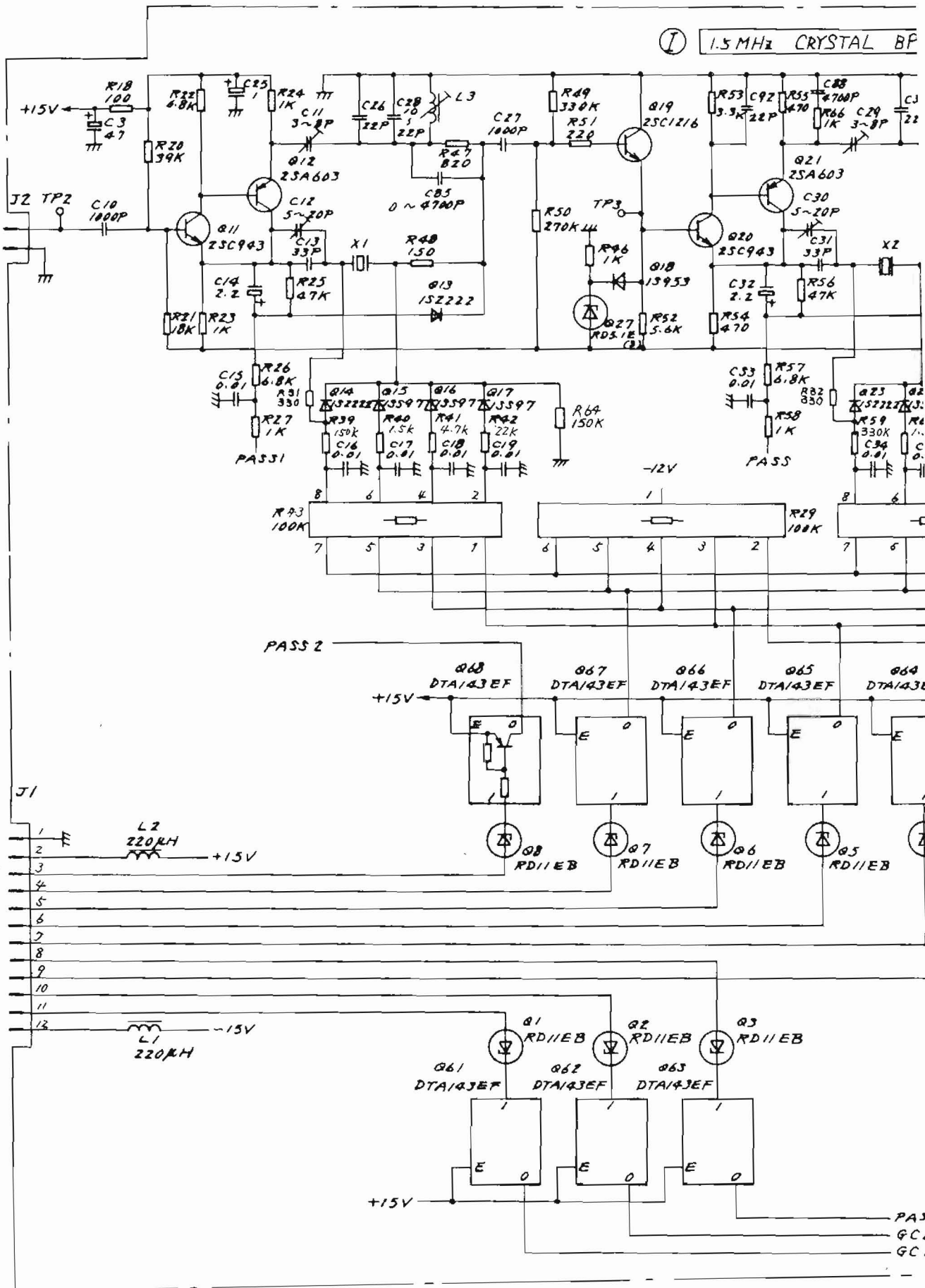




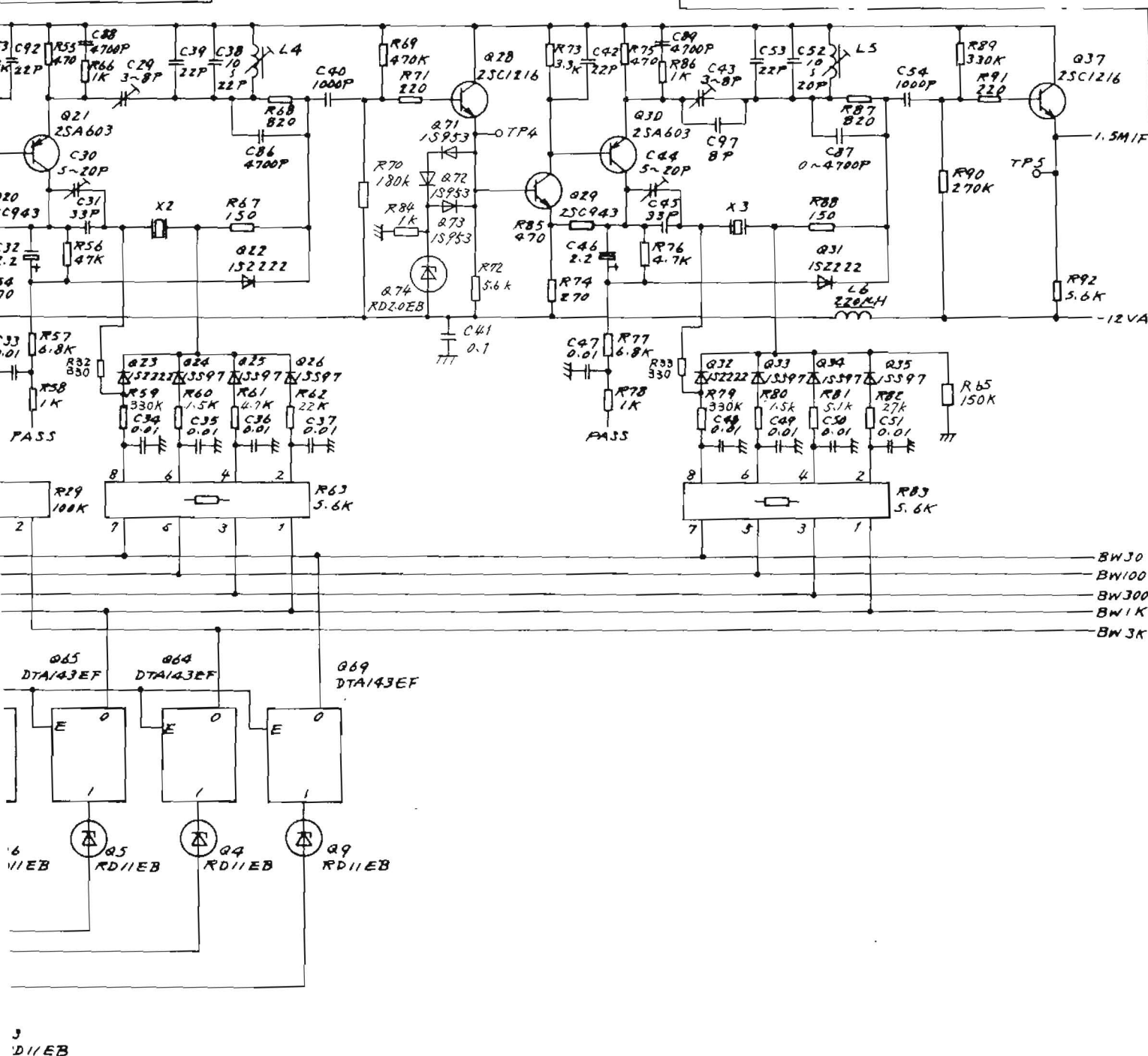
① 1.5 MHz CRYSTAL BP

from  
Z22-J10

to Z22-  
J5.



MHz CRYSTAL BPF



PC Board : 432U33861

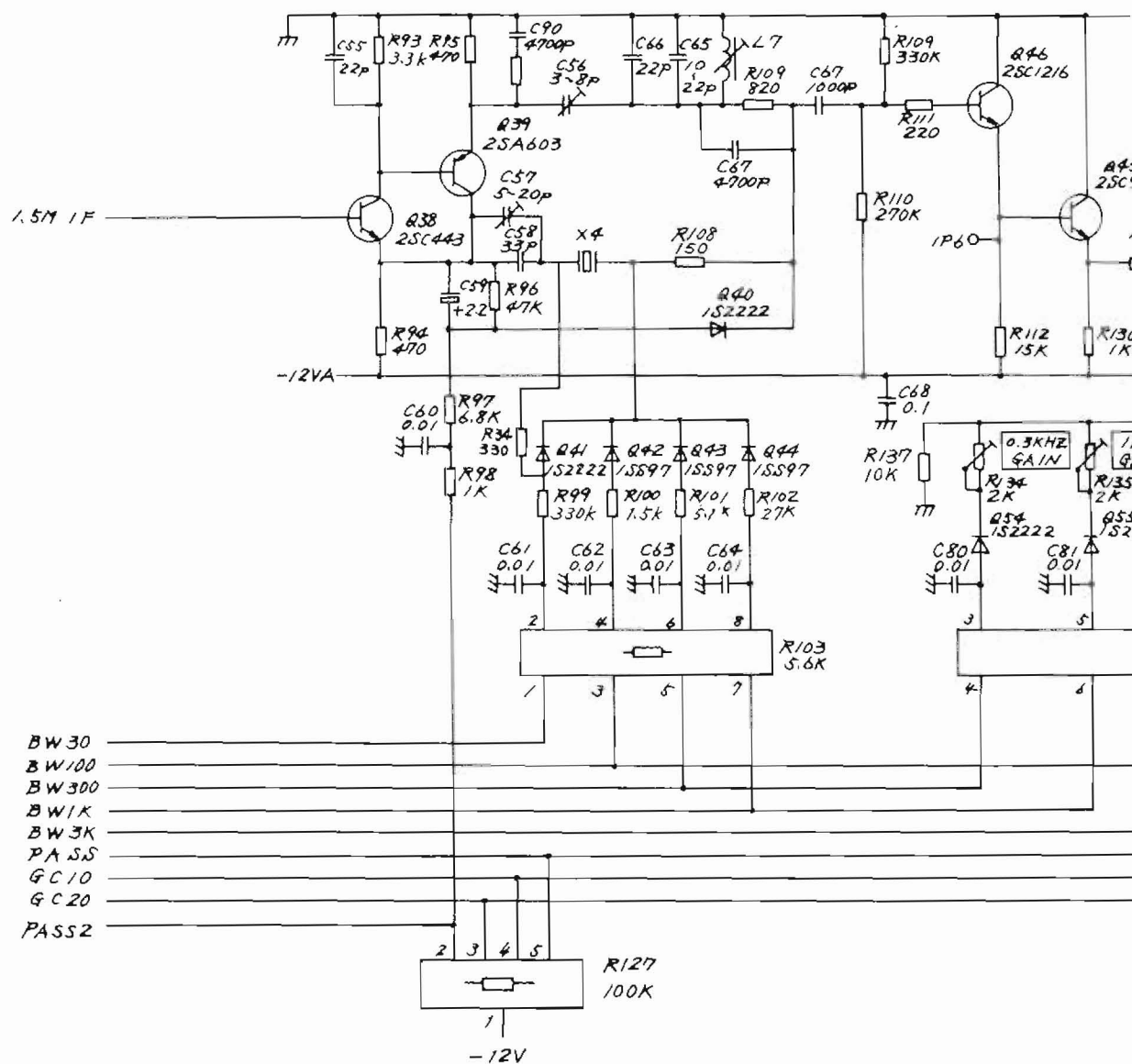
Parts List : 44W83951

Fig. 5-60 (1/2)

223 IF BPF/AMP 2 Circuit  
Diagram (1/2) (43W33954)

5-155/(5-156 blank)

1.5 MHz X'tal BPF





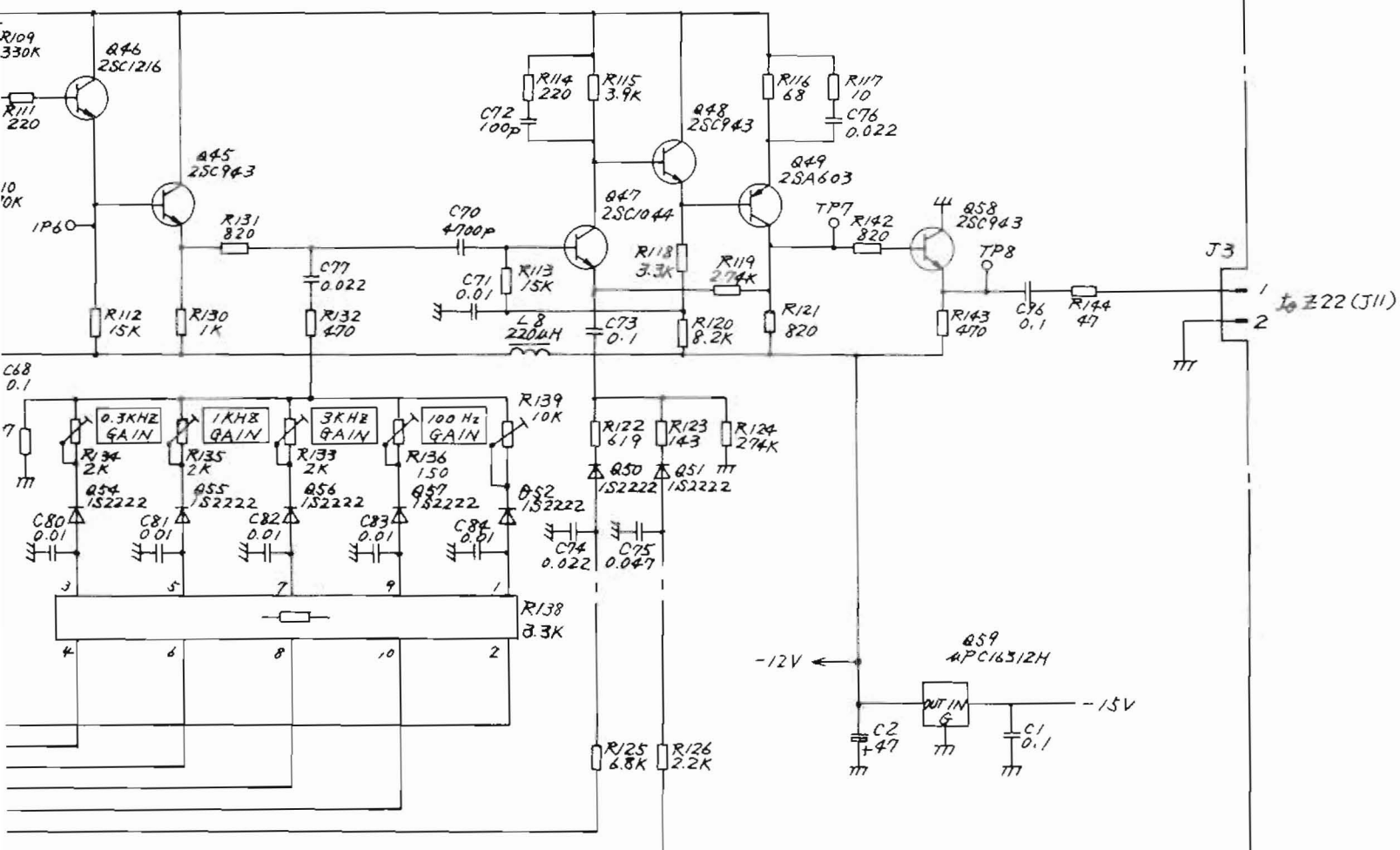


Fig. 5-60 (2/2)

Z23 IF BPF/AMP 2 Circuit  
Diagram (2/2) (43W33954)

5-157/(5-158 blank)

## 5.11 Z24 LOCAL CONTROL 2 (MS710C/E only)

### 5.11.1 Circuit description - Z24

This circuit consists of a 100 kHz step PLL circuit of the synthesizer that generates the first local signal and an AFC loop that improves the sweep frequency linearity of the first local VCO of the 10 kHz to 30 MHz band.

#### Part (A): 100 kHz step synthesizer

Latches Q2 and Q3 receive 10-bit frequency data sent from the Z26 CPU board and set the frequency division ratios for the 1/N programmable counters Q6 to Q8.

Decoder Q1 generates the chip selection signals of the latches Q2 and Q3 using CPU address data.

The 17.4  $\pm$  2 MHz REF VCO output signal sent from the Z21 local control 1 via J2 is amplified by amplifier Q11, frequency-divided in half by divider Q9, and sent to the 1/N programmable counters Q6 to Q8.

This 1/N output signal is compared to the 100 kHz reference signal by the phase frequency detector (PFD) Q13.

The PFD-detected voltage, which is amplified by dc amplifier Q14 and returned to the REF VCO in Z21 through sample hold Q15, controls the frequency of the REF VCO.

The Q15 is switched to the hold mode after the REF VCO frequency has been stabilized by the PLL.

#### Part (B): AFC loop for low band local osc

The 521.4 to 551.4 MHz local signal for a 10 kHz to 30 MHz band that is sent from the Z28 low local 1 via J3 is frequency-divided by a factor of 640 by dividers Q45, Q24, and Q25. It is converted from frequency to voltage with a PCD consisting of the monostable multivibrator Q26 and current switches Q27 and Q28.

This output voltage is compared to the frequency control signal by dc amplifier Q29 and returned from J4 to the Z28 low local 1 oscillator via dc amplifiers Q32 and Q40.

#### 5.11.2 Checking procedure - Z24

##### (1) 100 kHz step synthesizer check

Step	Procedure
1	Remove the shield case cover from the Z24 local control 2 according to Figs 2-1 and 2-5.
2	Set the MS710C/E as follows: <ul style="list-style-type: none"><li>. Frequency Band 1.7 to 23 GHz</li><li>. Center Frequency 3 GHz</li><li>. Span 0 Hz/div</li></ul>
3	Measure the dc voltage at Q15-5 ③ . The PLL circuit is normal when the measured value does not exceed $\pm 5$ V; is abnormal (PLL unlocked) when the value is close to the +15 or -15 V power source voltage.
4	Measure the frequency at Q13-3 ① . The 1/N programmable counter is normal when the measured value is 100 kHz.
5	Measure the frequency at Q12-9 ② . The reference signal is normal when the measured value is 100 kHz.

(2) AFC loop for low band local OSC check

Step	Procedure
1	Set the MS710C/E as follows: <ul style="list-style-type: none"><li>. Frequency band: 10 kHz to 30 MHz</li><li>. Center frequency: 15 MHz</li><li>. Span: 0 Hz/div</li></ul>
2	Measure the dc voltage at Q40-1 ④. The circuit is normal when the measured value is within -2 to 0 V.
3	Set the signal generator as follows and connect the output signal to Z24-J3. <ul style="list-style-type: none"><li>. Frequency: 536.4 MHz</li><li>. Output level: 0 dBm</li></ul>
4	Measure the frequency at Q26-1 ⑤. The circuit between J3 and Q25 is normal when the measured value is 838.125 kHz.

### 5.11.3 Adjustment - Z24

#### (1) 100 kHz step synthesizer adjustment

This circuit requires no adjustment.

#### (2) AFC loop for low band local OSC adjustment

Step	Procedure
1	Remove the shield case cover of the Z24 local control 2 according to Figs. 2-1 and 2-5.
2	Disconnect connector Z24-J6 and strap pins 1 and 2.
3	Disconnect the Z24-YTO C (R75).
4	Set the MS710C/E as follows:  Frequency band : 10 kHz to 30 MHz  Connect the signal generator to the MS710[ ] RF INPUT connector and set the following:  Frequency : 15 MHz Output level : 0 dBm  Check that the input signal spectrum is displayed on the MS710C/E CRT.
5	Set the signal generator frequency to 30 MHz.
6	Set the MS710C/E as follows:  Frequency band : 10 kHz to 30 MHz Center frequency : 0 Hz Span : 1 MHz/div  Adjust R83 to set the zero beat to the CRT center.

Step	Procedure
7	Set the MS710C/E center frequency to 30 MHz and adjust R42 to set the 30 MHz spectrum to the CRT center.
8	Repeat steps 6 and 7 to confirm that the 0 and 30 MHz center frequencies have not shifted from the CRT center by more than 1 MHz.
9	Connect the Z24-YTO C (R75) and connector Z24-J6.
10	Set the MS710C/E center frequency and signal generator frequency to 15 MHz.  Switch the MS710C/E span setting to 51 and 50 kHz/div alternately, and adjust R58 so that the spectrum waveforms correspond on the CRT overlap each other.
(SPAN	Adjustment)
11	Set the MS710C/E and signal generator as follows: (1) MS710C/E Frequency band : 10 kHz to 30 MHz Center frequency : 15 MHz Span : 3 MHz/div (2) Signal Generator Frequency : 15 MHz Output Level : 0 dBm
12	Adjust R36 so that the spectrum waveform is moved to the right or left edge of the CRT screen when the half-screen shift key ( $\llcorner$ , $\lrcorner$ ) is used.
13	Set the MS710C/E span to 100 kHz/div and adjust R40 in the same way as step 12.

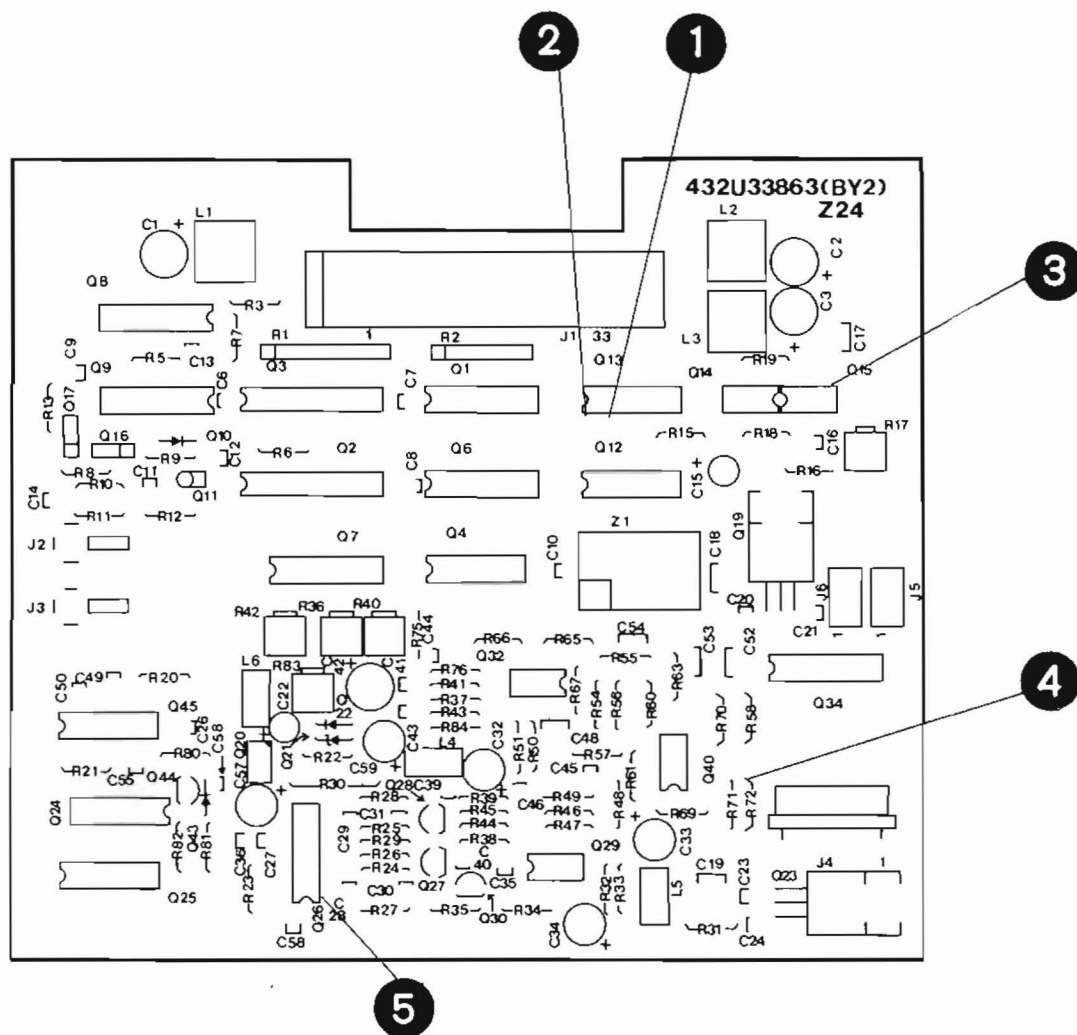
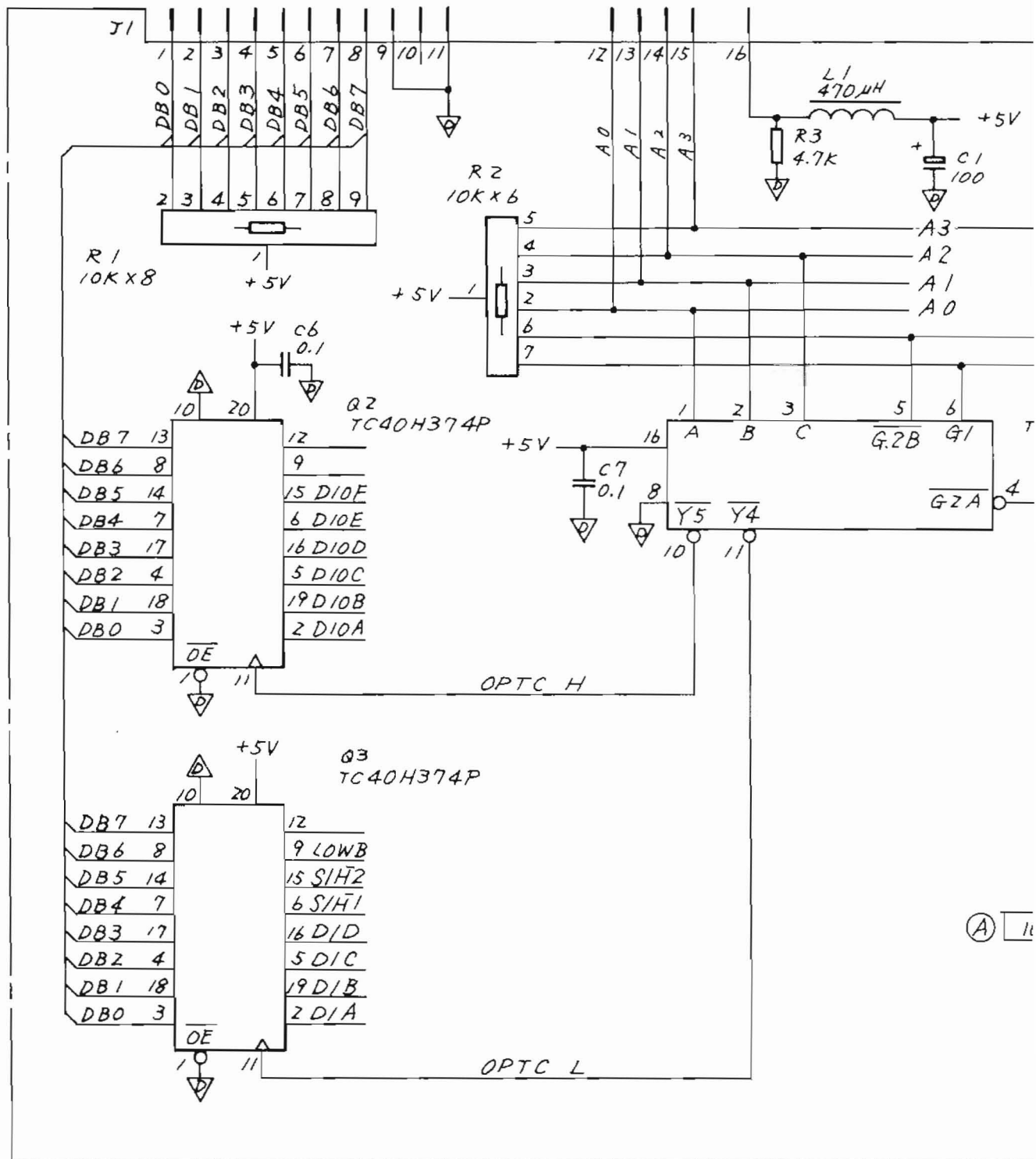
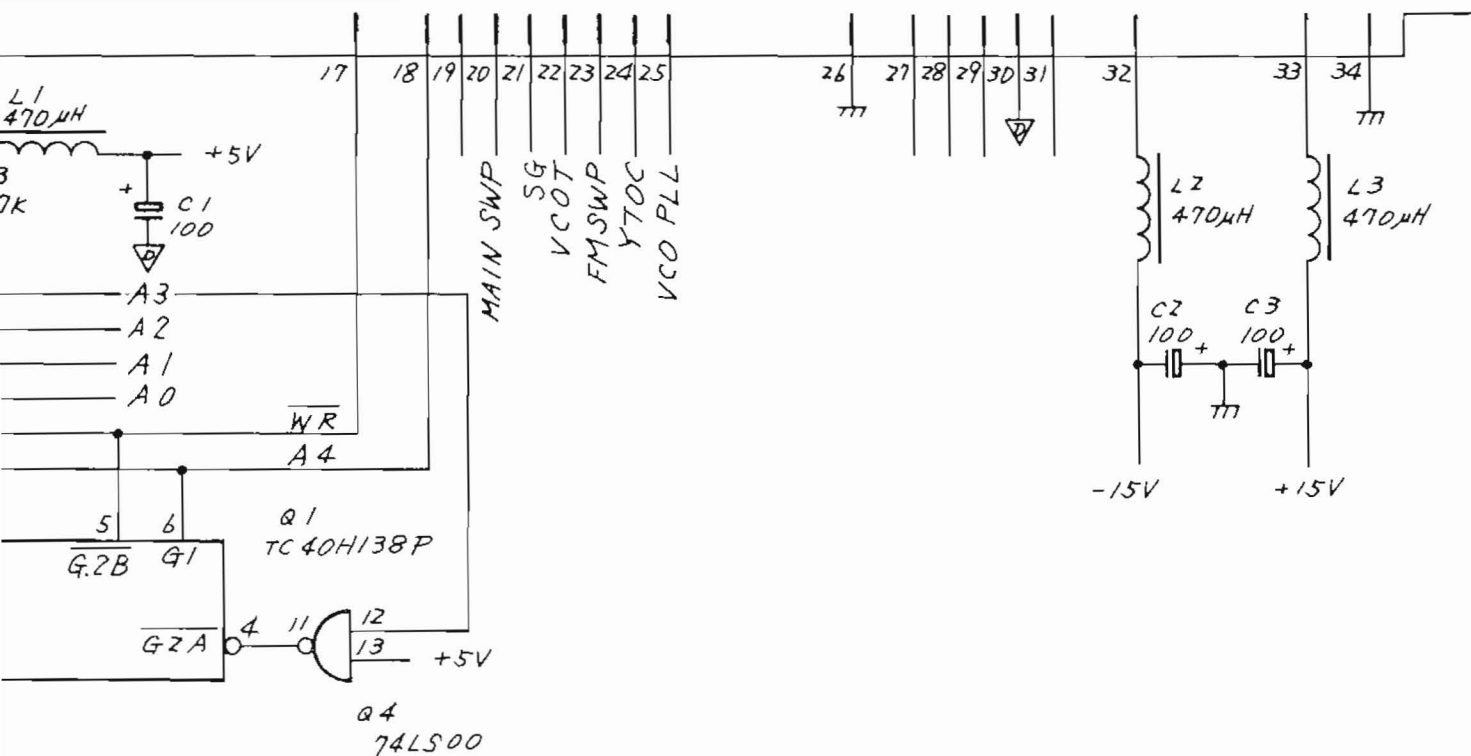


Fig. 5-61 Z24 Parts Layout



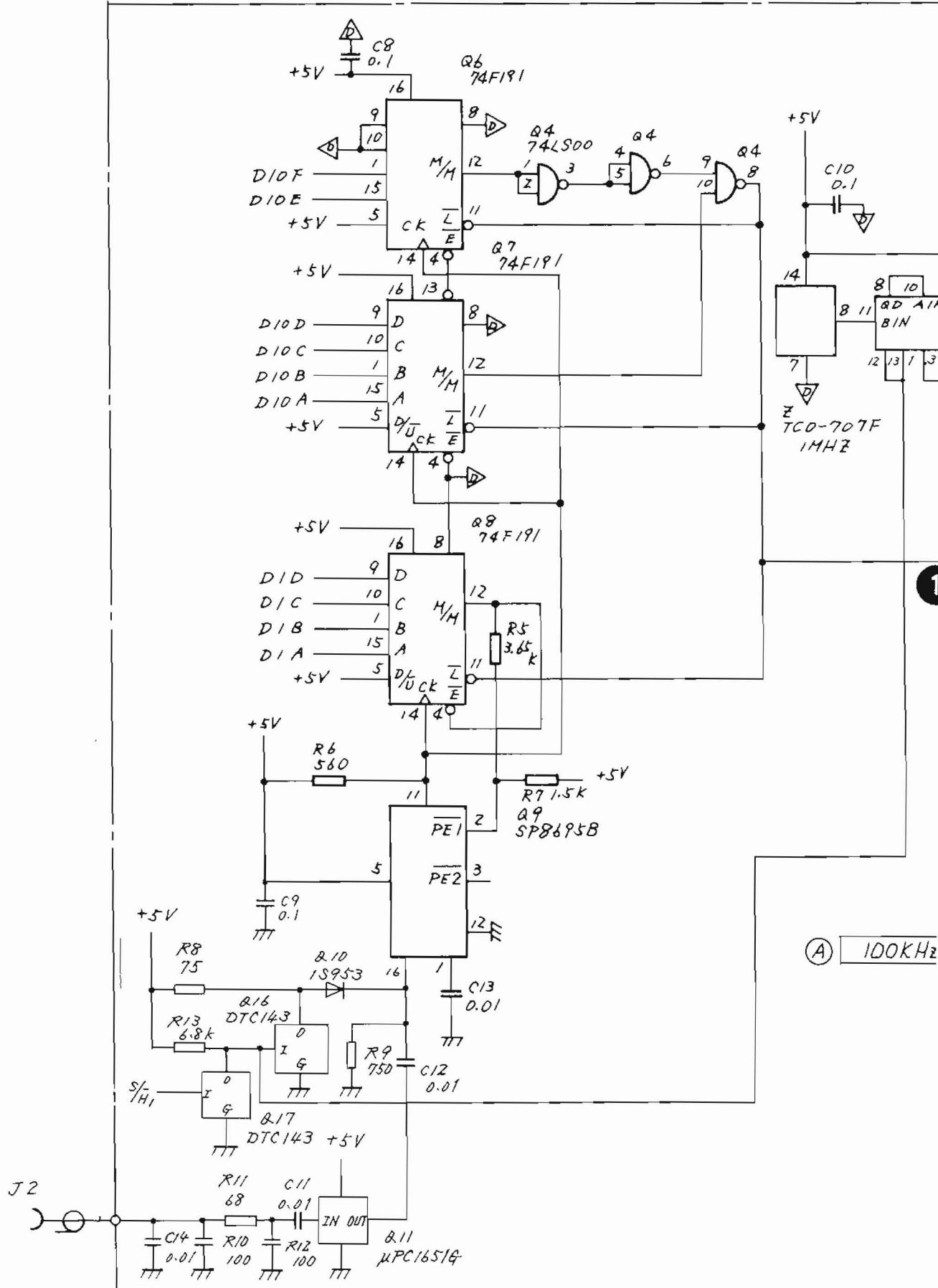
Pc Board: 432U33863  
Parts List: 44W83952





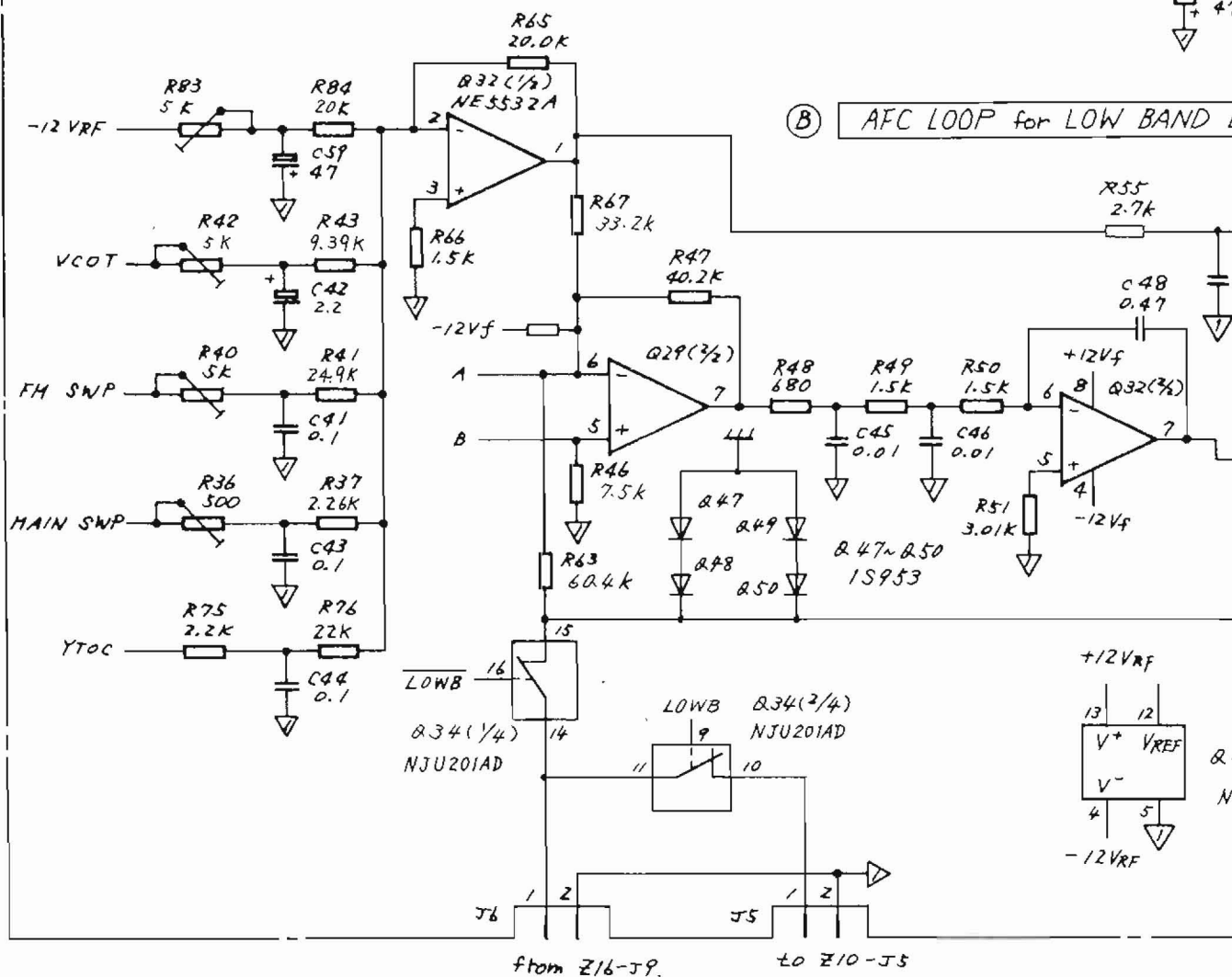
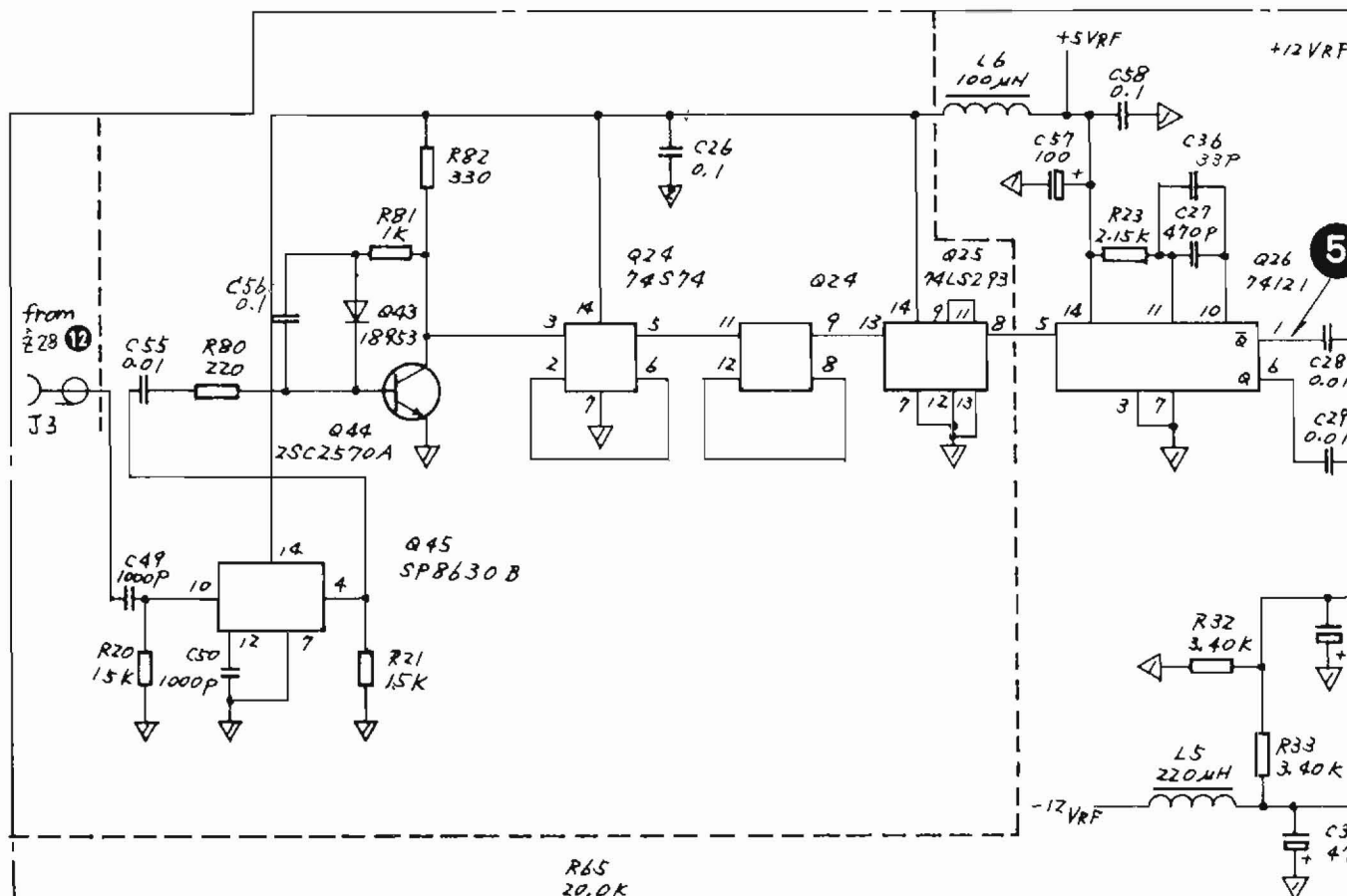
Ⓐ 100KHz STEP SYNTHESIZER (1/2)

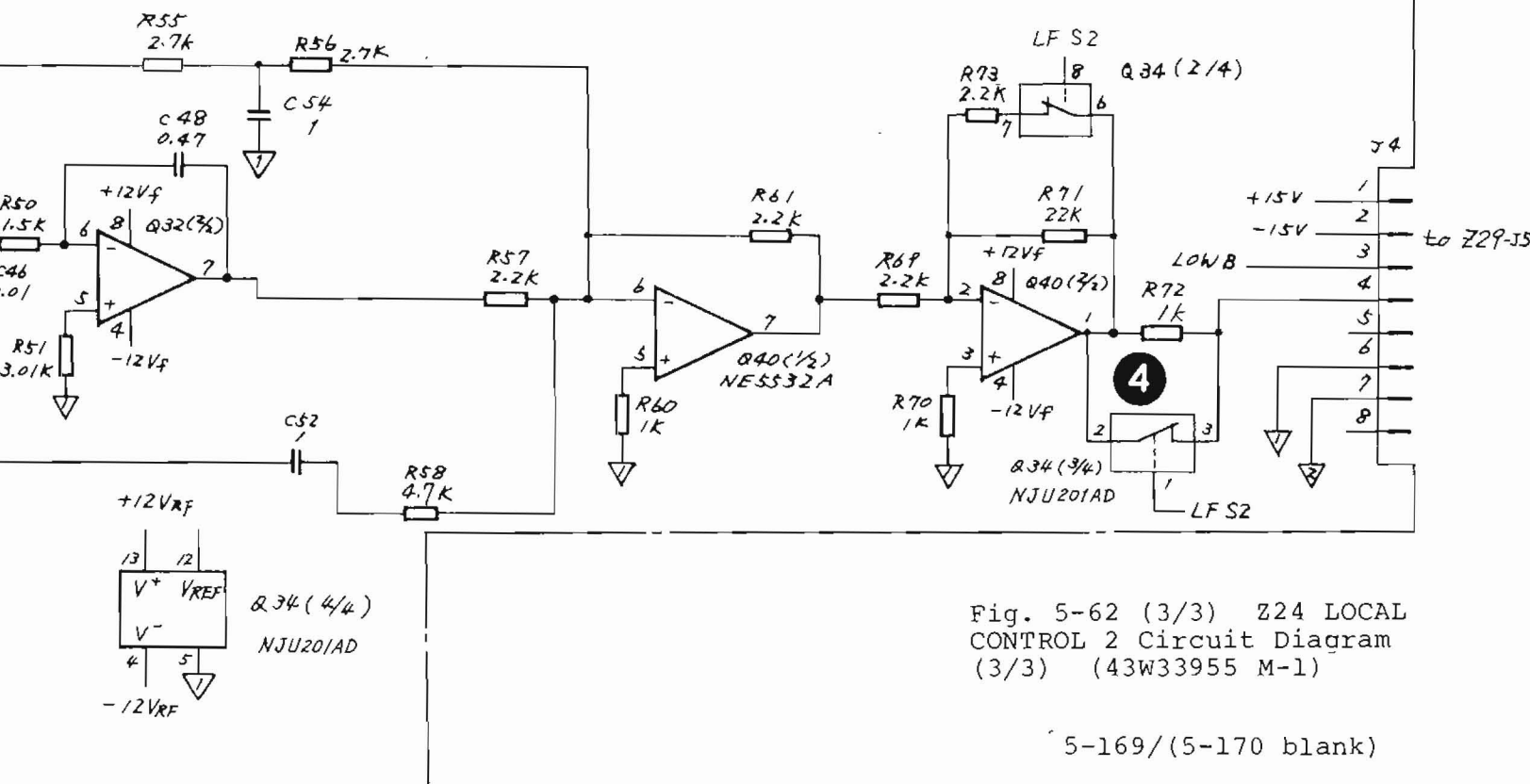
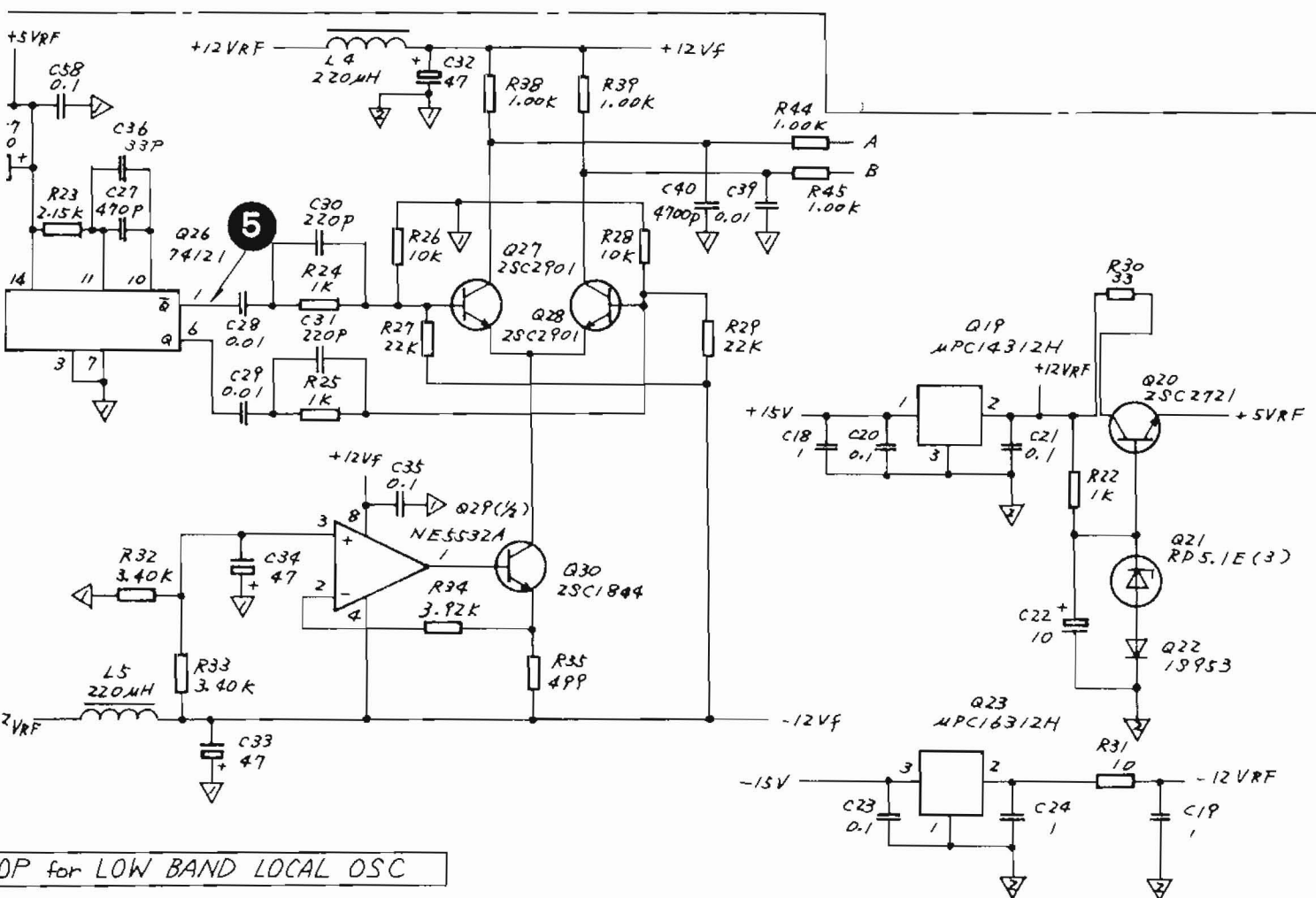
Fig. 5-62 (1/3) Z24 LOCAL  
CONTROL 2 Circuit Diagram  
(1/3) (43W33955)





5-167/(5-168 blank)





5-169/(5-170 blank)

## 5.12 Z25 LOG/LIN AMP DETECTOR

### 5.12.1 Circuit description - Z25

(Refer to Fig. 3-3 (2/4) and Fig. 5-64)

This PC board includes a log amplifier having 70 dB linearity for 21.4 MHz IF signals, a detector for envelope detection of 21.4 MHz IF signals, a video filter that restricts video signal bandwidth, a variable attenuator circuit, and an offset circuit for switching of CRT display sensitivity.

The Z25 circuit is divided into the 4 parts (A) to (D) shown in Fig. 5-64, and the circuit description for each part is as follows:

#### Part (A): 21.4 MHz LOG/LIN AMP

The 70 dB log amplifier consists of seven log amplifier stages having the same structure; 10 dB linearity is available for each stage.

When the MS710[ ] is used in the linear display mode, this circuit operates as the linear amplifier. Its gain can be switched in three steps in units of 10 dB by switching bias current.

#### Part (B): DETECTOR AND OFFSET CIRCUIT

The log amplifier output passes through the Q90 and Q91 buffer amplifiers and is detected by the envelope detector circuit that consists of Q95, Q96, and Q97.

Then the video signals in this output are filtered out. A part of the 21.4 MHz IF signals passing through the log amplifier is output to the rear panel through J2.

The video signal, buffered and added with offset voltage to set the reference levels by using the Q101 high-speed OP amplifier, is sent to the video filter circuit.

Part (C): VIDEO FILTER AND SCALE SELECTOR

The video filter is an RC LPF circuit and its cutoff frequency can be switched by the control signals sent from the Z26 CPU board through the Q119 latch. The video signal passing through the Q113 buffer amplifier is adjusted according to the CRT display scale value (10, 5, 2, and 1 dB/div) by the variable attenuator consisting of R196 to R200, Q115, and Q133.

This video signal is passed through the Q135 analog switch and Q136 buffer amplifier and then output to the Z26 CPU board.

The Q134 sample & hold and Q135 switching circuits are used to prevent unnecessary response from being generated in video output when the harmonic mixing is changed during a single sweep. These circuits are also used to eliminate unnecessary components when the sweep frequency exceeds the end of the frequency band.

A part of the video signal is also output to the rear panel through the Q137 buffer amplifier and J4.

Part (D): CONTROL CIRCUIT

Q118, Q119, and Q120 are used as the latch and address decoder that receives control signals from the Z26 CPU board. (See paragraph 5.13).

### 5.12.2 Checking procedure - Z25

Step	Procedure
1.	Remove the top cover and the PC board cover plate (15). See Figs. 2-1 and 2-5.
2.	Remove the Z33-J3 connected to the Z25-J1 and input the 21.4 MHz, +4 dBm signal to the Z25-J1 from a signal generator.
3.	Turn on the MS710C power switch and set the CENTER FREQ to 3 GHz and the REFERENCE LEVEL to -40 dBm.  In this case, a horizontal-line-shaped trace should be displayed near the Reference Level (uppermost scale) on the CRT when the MS710[ ] operation is normal.
4.	The correct 21.4 MHz IF OUTPUT level on the rear panel is $-6 \pm 1$ dBm, and the correct VIDEO OUTPUT value is +4 V. If the VIDEO OUTPUT is normal but display in step 3 is abnormal, circuits Z26 to Z34 are faulty.  If the IF OUTPUT is normal but the VIDEO OUTPUT is abnormal, the circuit between Parts (B) and (C) following the envelope detector is faulty. In this case, go to step 9.
5.	Switch the Vertical Scale to LIN. In this case, both the screen display and IF OUTPUT vary only slightly, but they are normal.



Step

Procedure

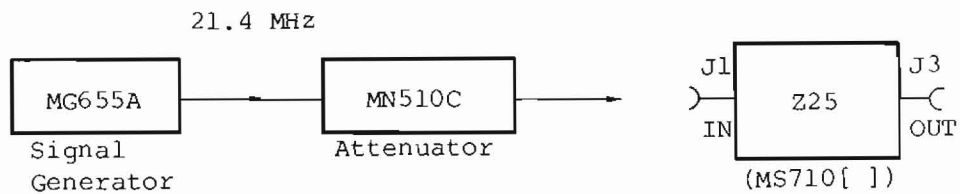
6. Reducing the signal generator level from +4 dBm to -6 dBm, -16 dBm, -26 dBm, and -36 dBm in steps of 10 dB, set the MS710[ ] reference level to -50, -60, -70, and -80 dBm corresponding to the step changes above and confirm that the IF OUTPUT level drops by 10 dB then returns to the original level in each change of the level. If the above check is all right, the operations of the linear amplifier in Part A are normal.
7. Return the Vertical Scale to 10 dB/div, the Reference Level to -40 dBm, and the signal generator output level to +4 dBm. Finely adjust the output level of the signal generator and match the spectrum trace to the uppermost scale.
8. When the signal generator output is reduced from the level in step 7 in 10 dB steps, the 21.4 MHz IF OUTPUT level on the rear panel and the CRT display should be as follows:

Signal generator level		IF OUTPUT		Display
Standard value	(+4 dBm)	-5.6 dBm	(0 dB)	REFERENCE LEVEL
-10 dB	(-6 dBm)	-6.8 dBm	(-1.2 dB)	-10 dB
-20 dB	(-16 dBm)	-8.1 dBm	(-2.5 dB)	-20 dB
-30 dB	(-26 dBm)	-9.7 dBm	(-4.1 dB)	-30 dB
-40 dB	(-36 dBm)	-11.6 dBm	(-6.0 dB)	-40 dB
-50 dB	(-46 dBm)	-14.1 dBm	(-8.5 dB)	-50 dB
-60 dB	(-56 dBm)	-17.6 dBm	(-12.0 dB)	-60 dB
-70 dB	(-66 dBm)	-23.7 dBm	(-18.1 dB)	-70 dB

9. Turn off the power switch of the MS710[ ]. Using the service kit extender cable for J51, remove the 225 PC board by pulling it up.

Step	Procedure
10.	Set as explained in Steps 2 and 3.
11.	Check the TP3 voltage using an oscilloscope or a digital voltmeter. When the voltage is approximately +4 V, the detector circuit in Part (B) is normal.
12.	Reduce the output level of the signal generator by 60 dB to -56 dBm and confirm that the TP3 voltage changes to approximately 1 V.
13.	After checking that the TP2 voltage is -5 V, vary the MS710C REFERENCE LEVEL from -40 dBm to -50 dBm, -60 dBm, ..., and -100 dBm in steps of 10 dB and check that the TP3 voltage increases by 0.5 V each and every time.
14.	Set the signal generator level so that the TP3 voltage is +4 V. Then check the voltage of TP4 (0 V), TP5 (0 V), and TP6 (+4 V).
15.	To check the VIDEO FILTER, use a low frequency oscillator to apply a signal from 0.1 Hz to 5 MHz to checkpoint ①. Set the MS710[ ] VIDEO FILTER to 1 Hz to 3 MHz, measure the TP6 output using an oscilloscope, and check the video filter cutoff frequency.

### 5.12.3 Adjustment - Z25



#### (1) LOG Amplifier Tuning Adjustment

Step	Procedure
1.	Set the attenuation of the MN510C to 0 dB.
2.	Connect a digital voltmeter to TP3.
3.	Adjust C7, C17, C27, C37, C47, C57, and C67 so that the reading on the digital voltmeter is at a maximum.

#### (2) Reference Voltage Adjustment

Step	Procedure
1.	Connect the digital voltmeter to TP2.
2.	Adjust R169 so that the reading on the digital voltmeter indicates -5.000 V.

### (3) DC Amplifier Adjustment

Step	Procedure
1.	Connect Q101-3 to the ground.
2.	Adjust R182 so that the reading on the digital voltmeter indicates 0.000 V at TP3.
3.	Adjust R193 so that the reading on the digital voltmeter indicates -8.000 V at TP4.
4.	Adjust R216 so that the reading on the digital voltmeter indicates 0.000 V at TP6.
5.	Adjust the level of the MG655A (approx. +4 dBm) so that the reading of the digital voltmeter indicates +4.000 V at TP3. The attenuation of MN510C has to be set to 0 dB at this time.
6.	Adjust R213 so that the reading on the digital voltmeter indicates +4.000 V at TP6.
7.	Repeat steps 4 to 6 a few times to satisfy the conditions simultaneously.

### (4) Linearity Adjustment

Step	Procedure
1.	Connect Z25-J3 to Z26-J7.
2.	Set the MS710[ ] Vertical Scale to 10 dB/div.

Step	Procedure														
3.	Confirm that the display line is at the top scale position of the CRT. If not, Z34 DIGITAL MEMORY/GP-IB PC board should be checked. See paragraph 5.20.														
4.	<p>Change the MN510C attenuation from 0 to 70 dB in 10 dB steps. Display error should be within <math>\pm 1.5</math> dB at each step.</p> <p>If the error is out of the range of <math>\pm 1.5</math> dB, adjust the following resistors according to the range where the error occurs.</p> <table><tr><td>0 to 10 dB:</td><td>R9, R12</td></tr><tr><td>10 to 20 dB:</td><td>R29</td></tr><tr><td>20 to 30 dB:</td><td>R49</td></tr><tr><td>30 to 40 dB:</td><td>R69</td></tr><tr><td>40 to 50 dB:</td><td>R89</td></tr><tr><td>50 to 60 dB:</td><td>R110</td></tr><tr><td>60 to 70 dB:</td><td>R134</td></tr></table>	0 to 10 dB:	R9, R12	10 to 20 dB:	R29	20 to 30 dB:	R49	30 to 40 dB:	R69	40 to 50 dB:	R89	50 to 60 dB:	R110	60 to 70 dB:	R134
0 to 10 dB:	R9, R12														
10 to 20 dB:	R29														
20 to 30 dB:	R49														
30 to 40 dB:	R69														
40 to 50 dB:	R89														
50 to 60 dB:	R110														
60 to 70 dB:	R134														
5.	Set the MS710[ ] Vertical Scale 1 dB/div.														
6.	Set the MN510C to 0 dB.														
7.	<p>Change the MN510C attenuation from 0 to 8 dB by 1 dB steps. The display error should be within <math>\pm 0.2</math> dB at each step.</p> <p>If the error is out of the range of <math>\pm 0.2</math> dB, adjust R12.</p>														

(5) LIN Scale Level Adjustment

Step	Procedure
1.	Connect Z25-J3 to Z26-J7.
2.	Set the MS710C Vertical Scale to LIN.
3.	Set the MN510C to 0 dB. Adjust R107 so that the display line is at the top scale position on the CRT.

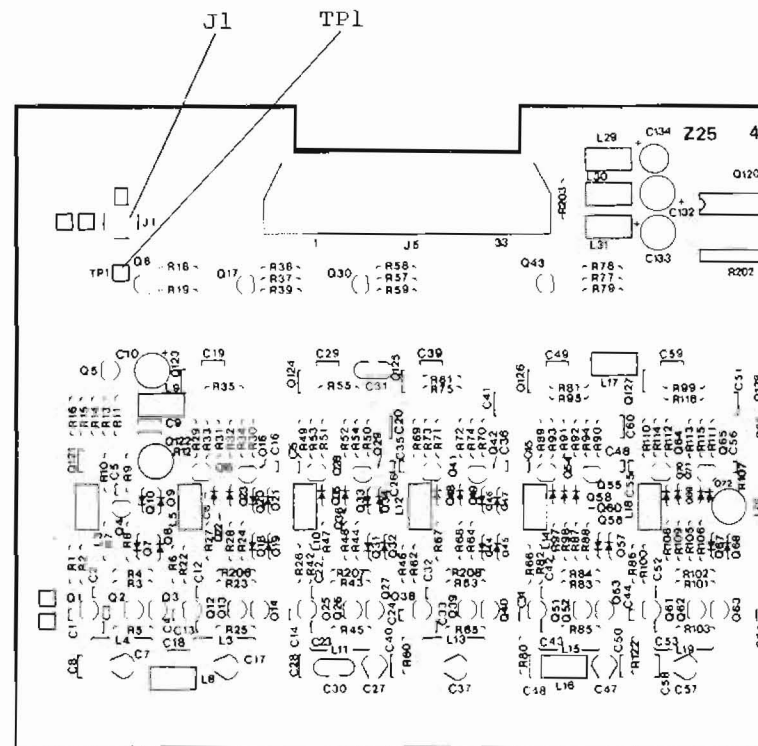
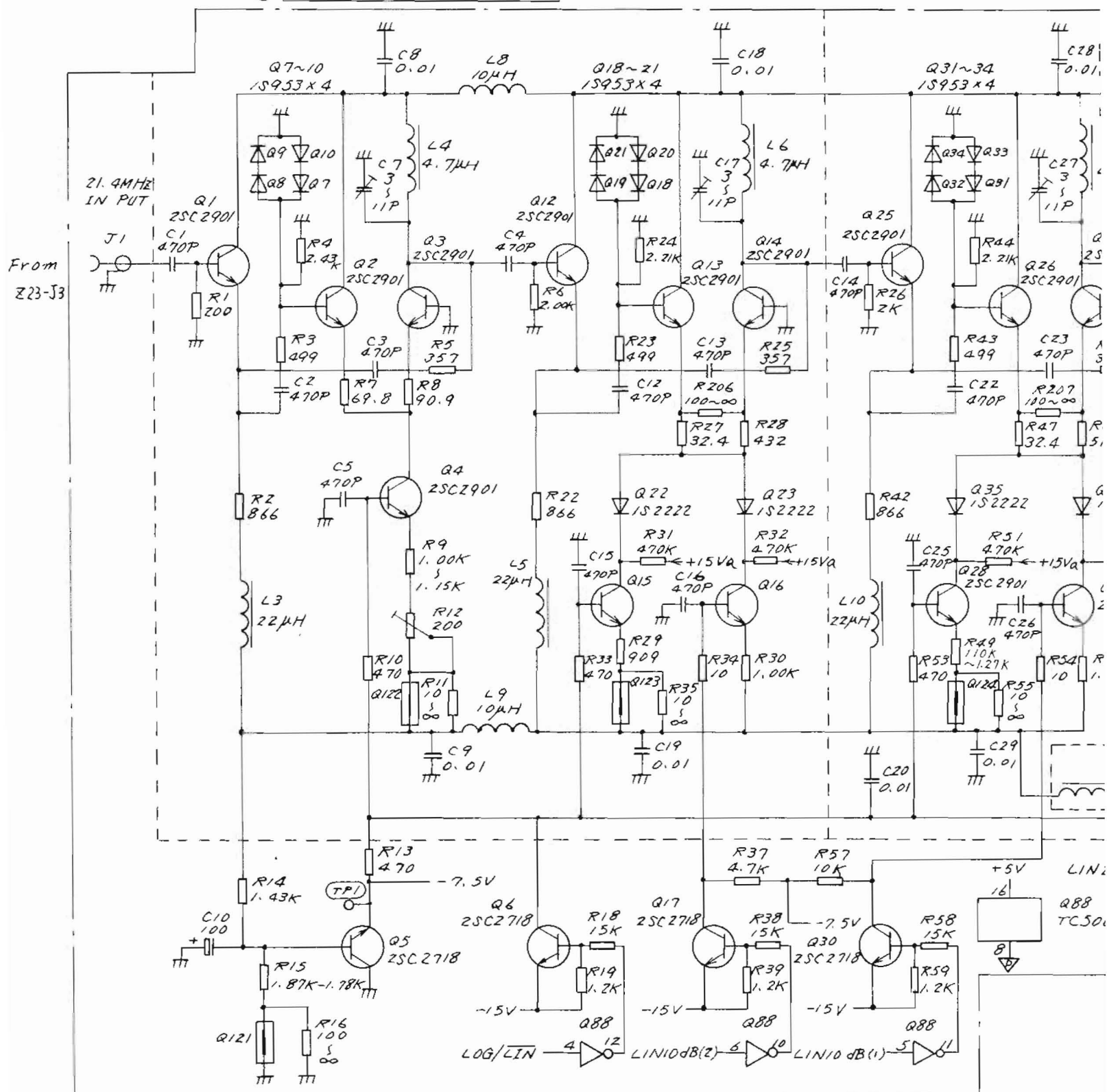


Fig. 5-63 Z25 Parts Layout

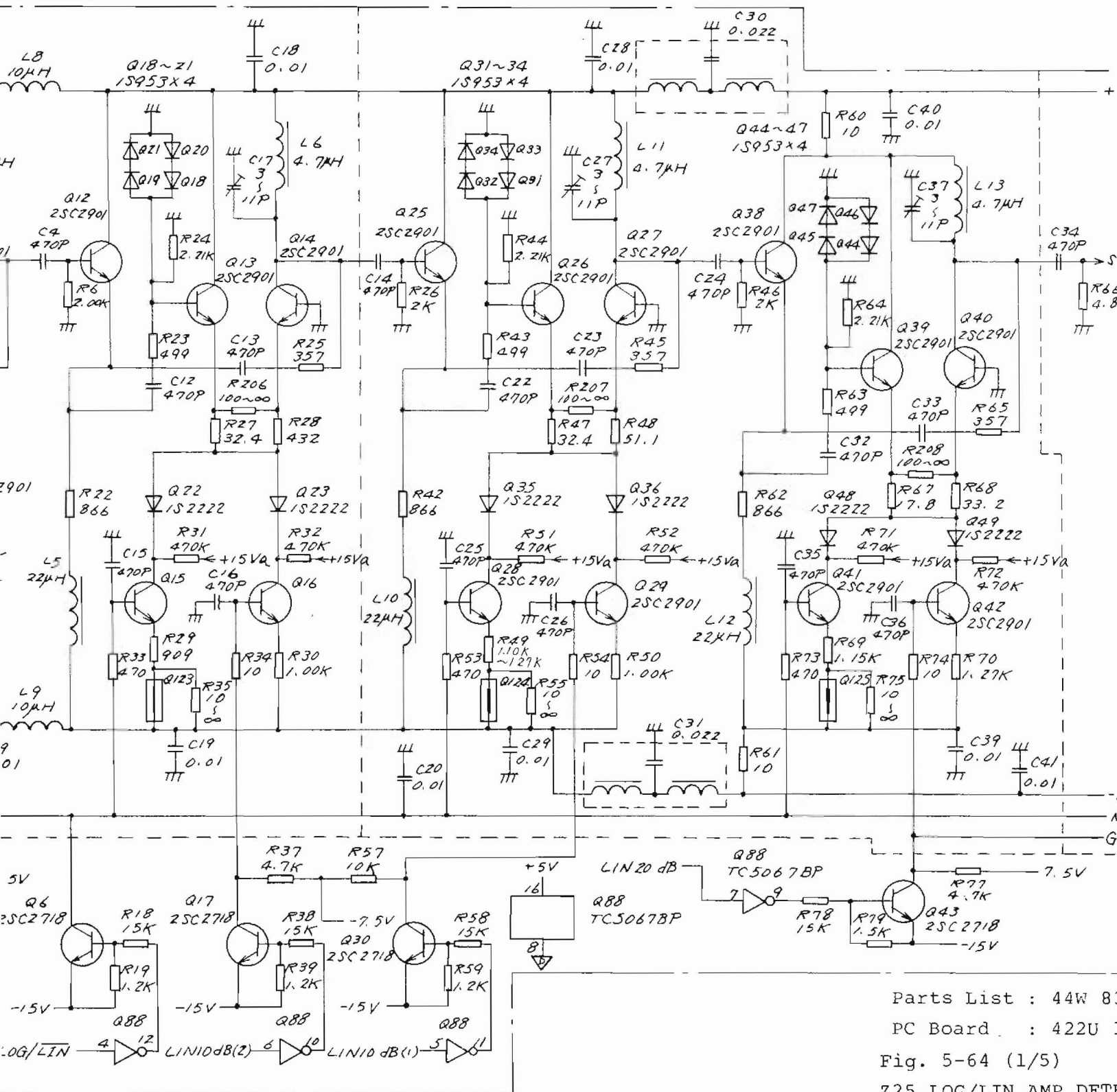




# (A) 21.4 MHz LOG/LIN AMP



IN AMP



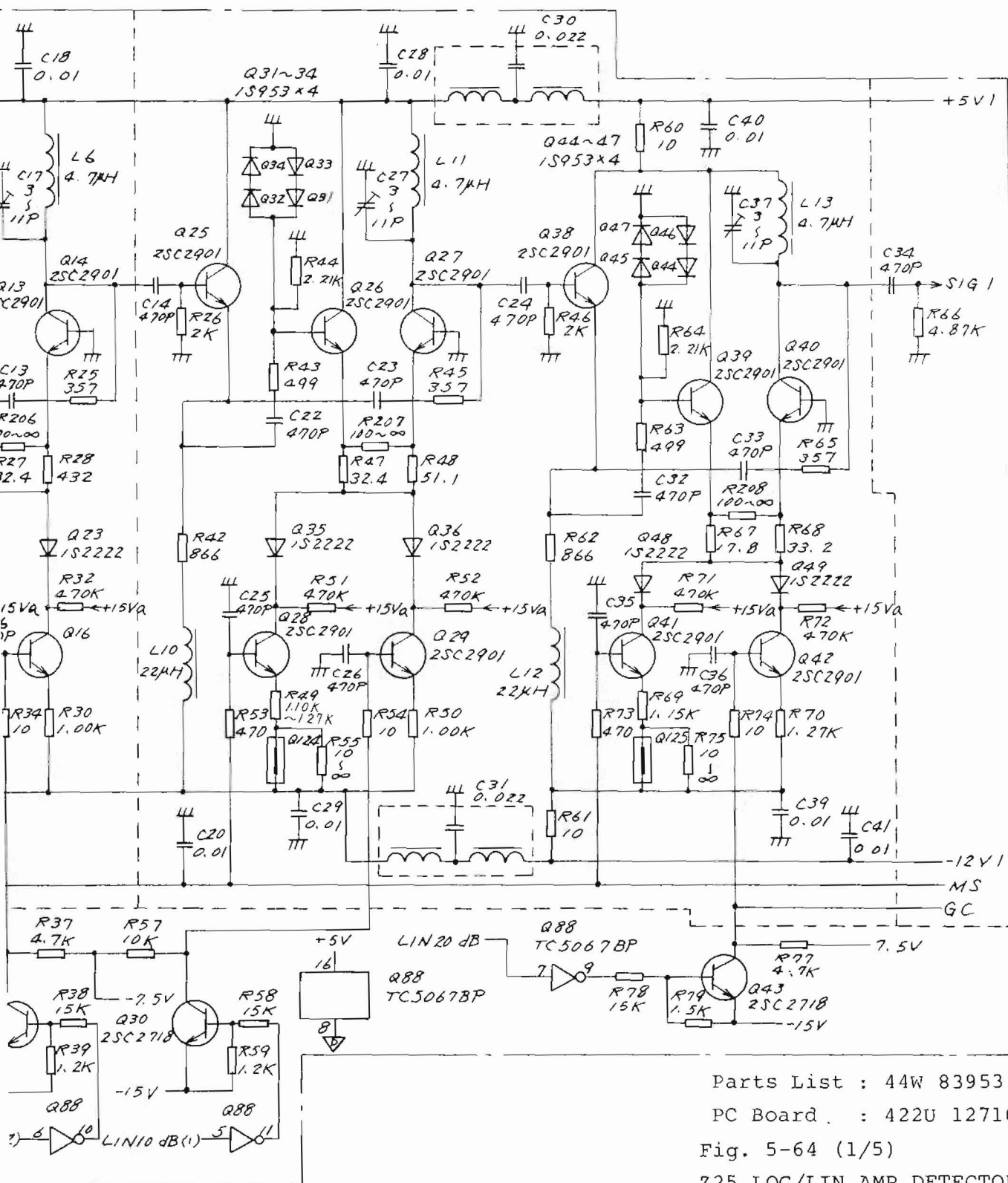
Parts List : 44W 8

PC Board : 422U 1

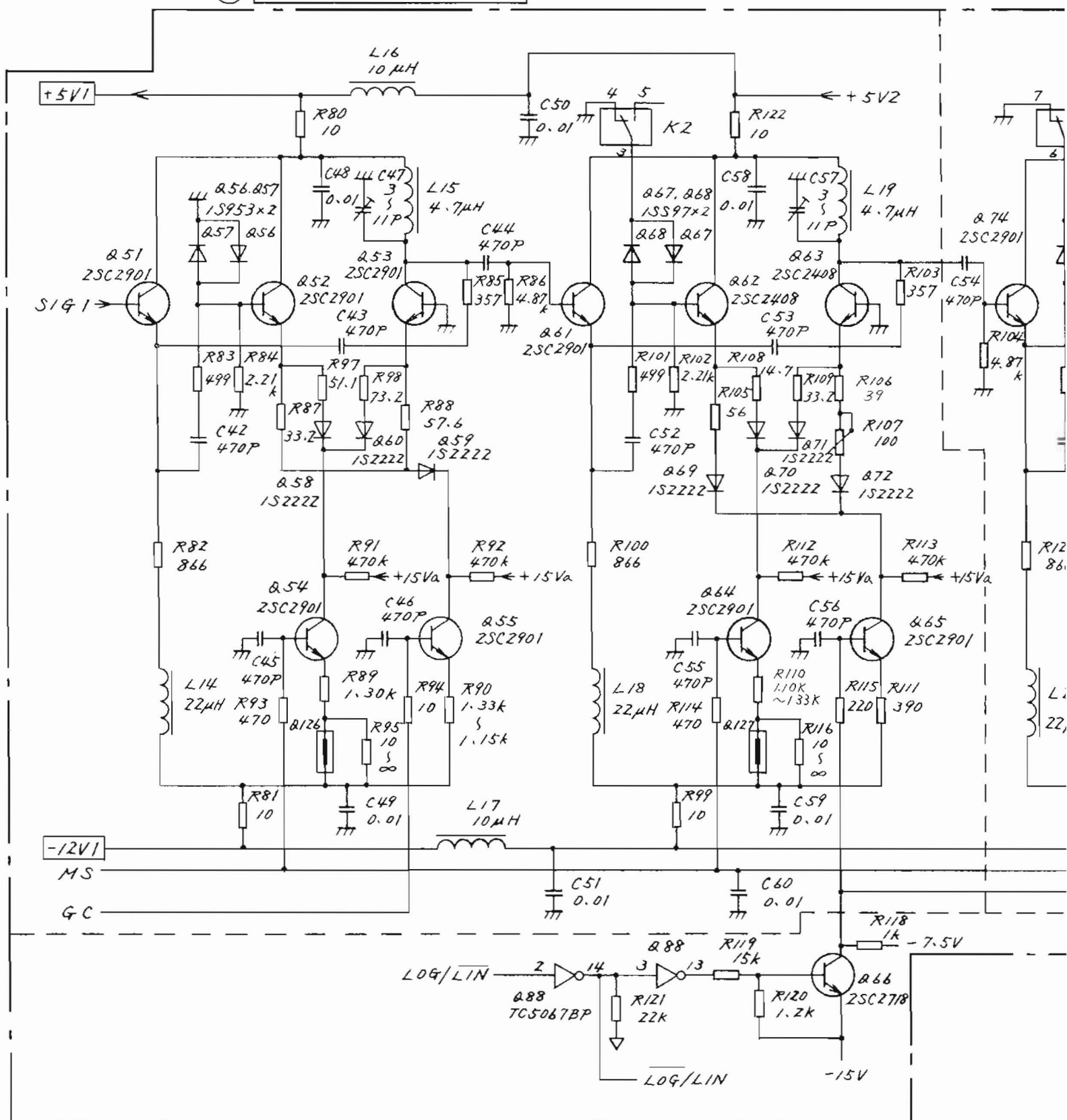
Fig. 5-64 (1/5)

Z25 LOG/LIN AMP DET  
Circuit Diagram (1/5)  
(43W 33956)

5-181/(5-182 blank)

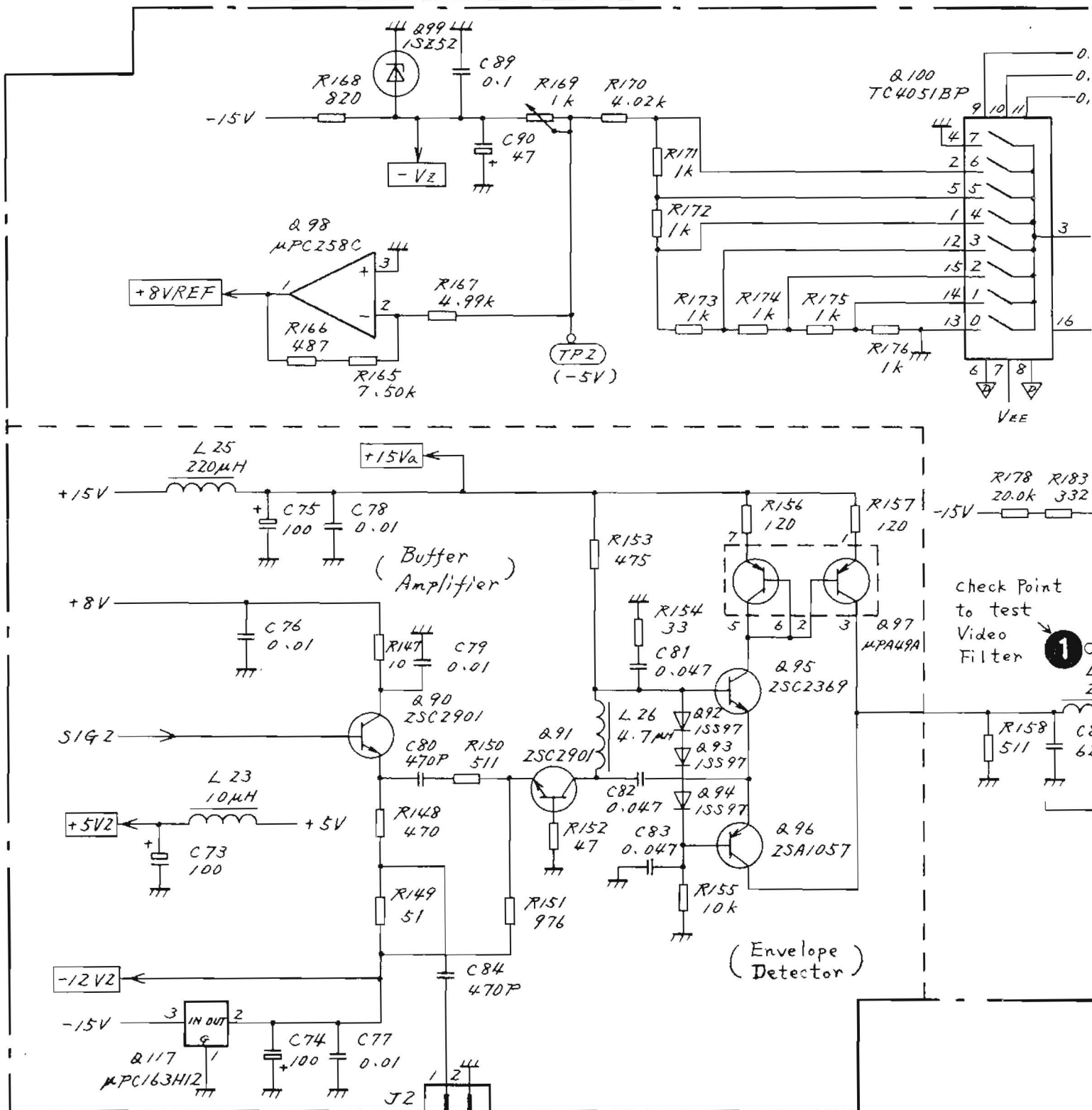


(A) 21.4MHz LOG/LIN AMP





# (B) DETECTOR AND OFFSET CIRCUIT



IF OUT PUT 21.4MHz

Typ. - 6dBm  
for Full-Scale Display.

UNIT

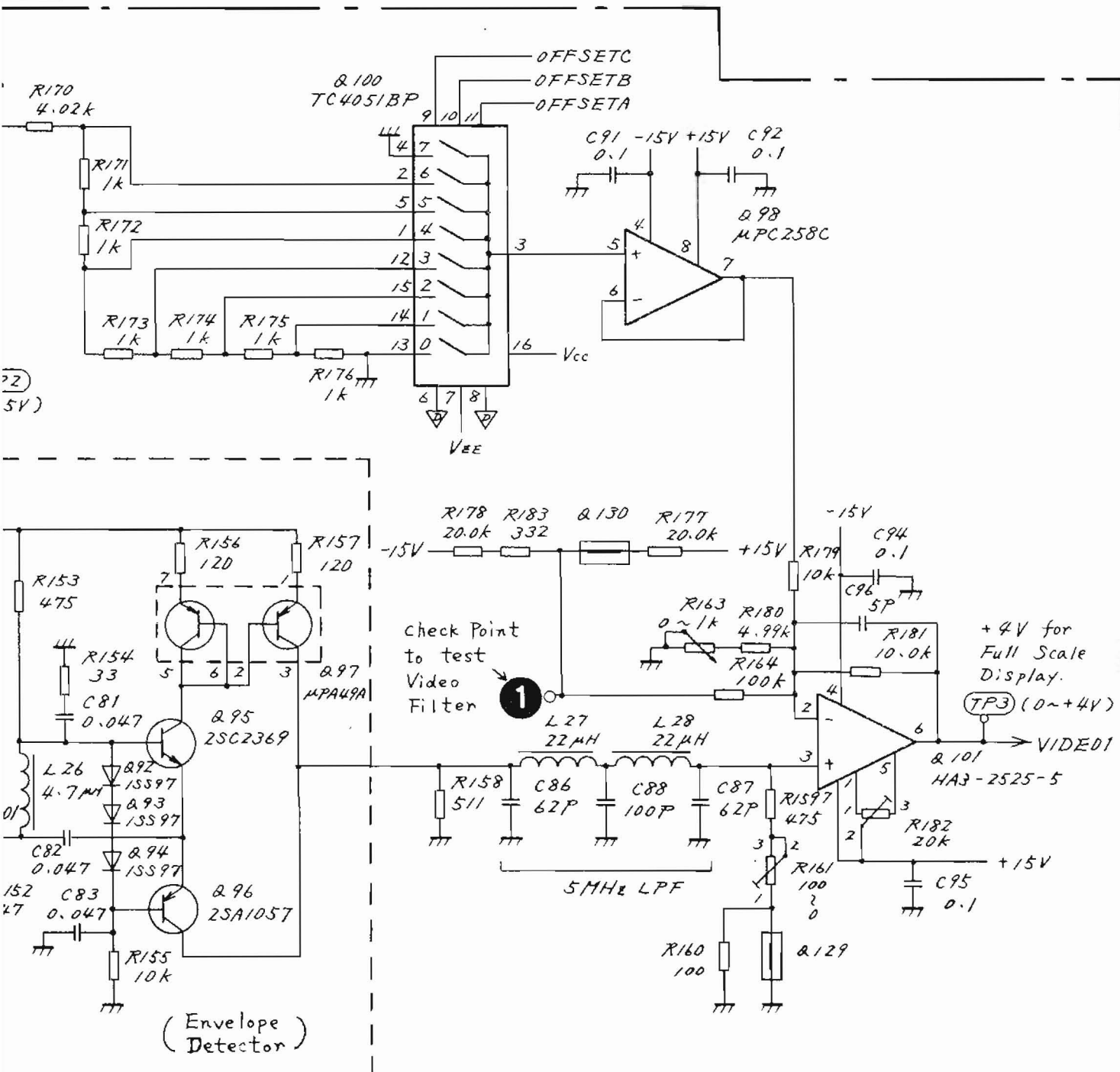


Fig. 5-64 (3/5)

Z25 LOG/LIN AMP DETECTOR  
Circuit Diagram (3/5)  
(43W 33956)

③

[illegible]



# SCALE SELECTOR

(VIDEO FILTER)

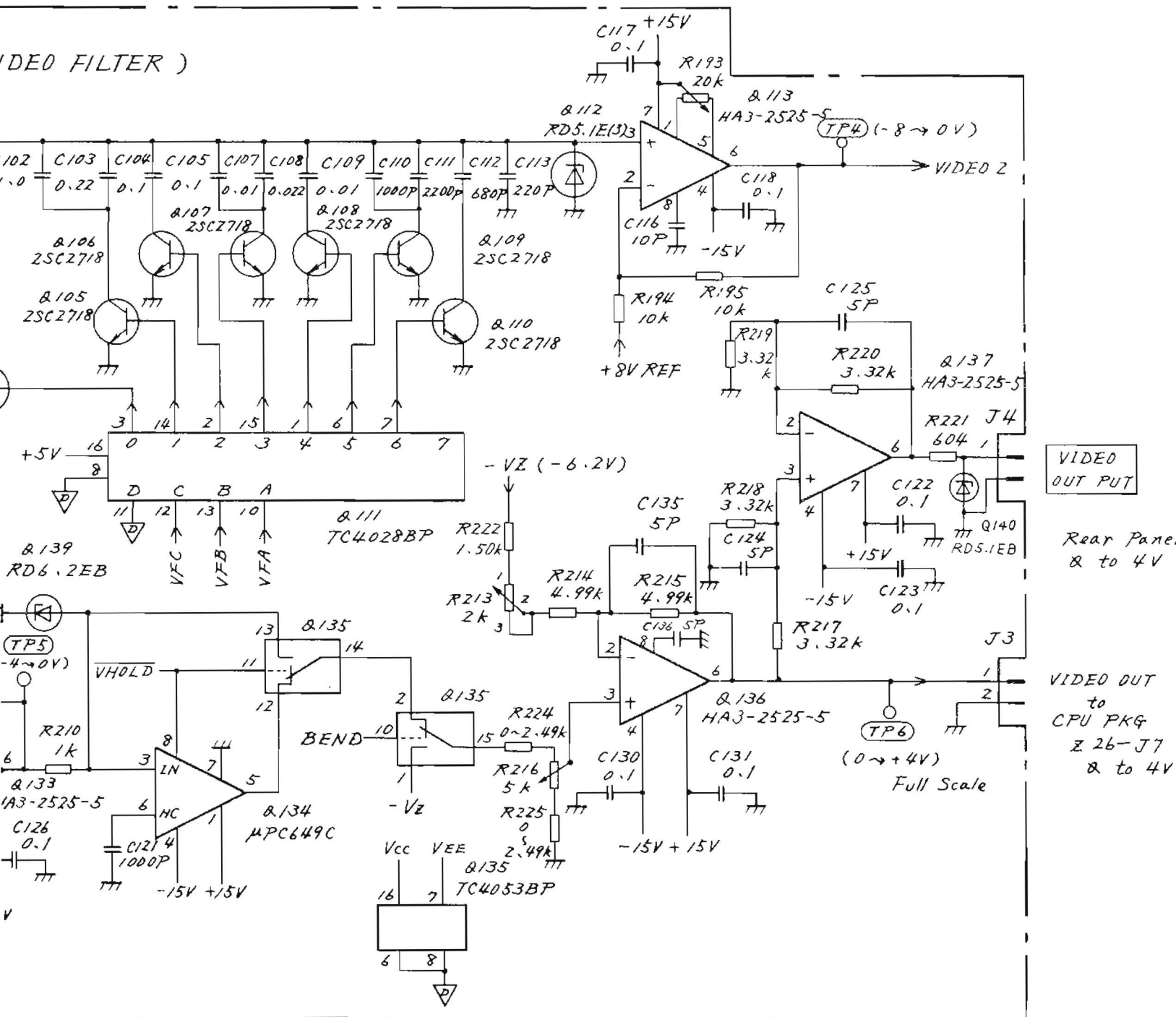


Fig. 5-64 (4/5)

Z25 LOG/LIN AMP DETECTOR  
Circuit Diagram (4/5)  
(43W 33956)

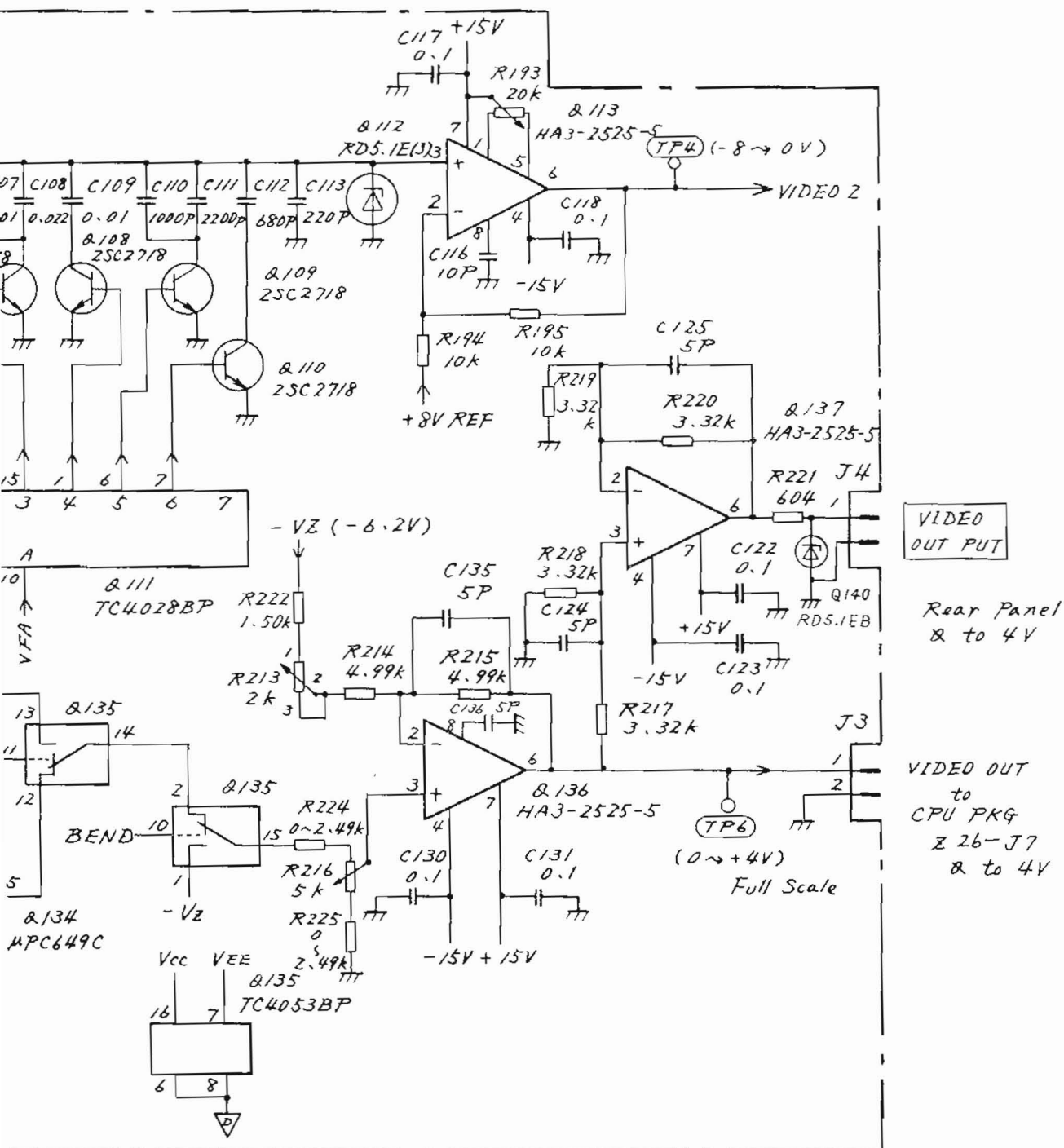


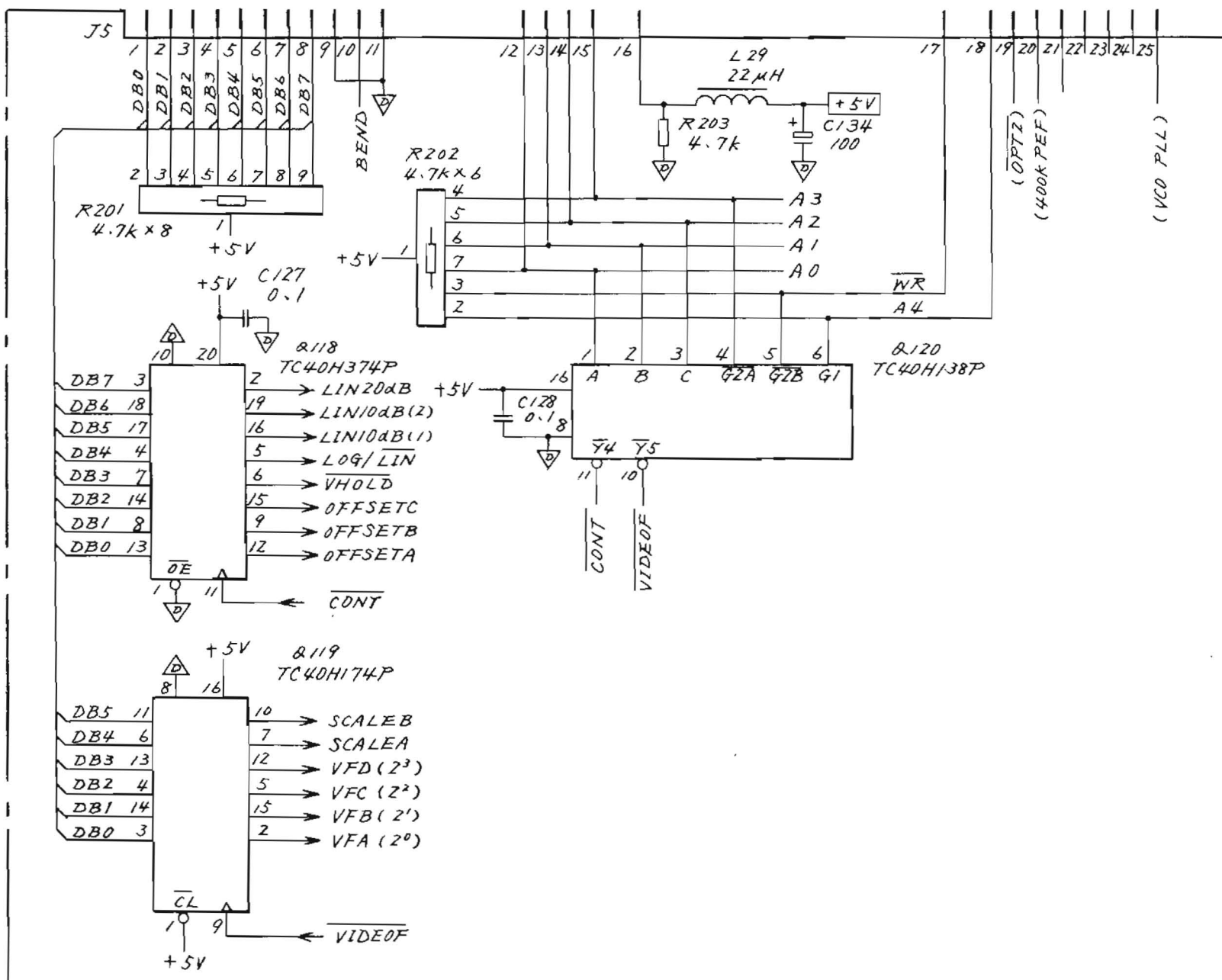
Fig. 5-64 (4/5)

Z25 LOG/LIN AMP DETECTOR  
Circuit Diagram (4/5)  
(43W 33956)

# ① CONTROL CIRCUIT

Z 26-J4

J51



-J4

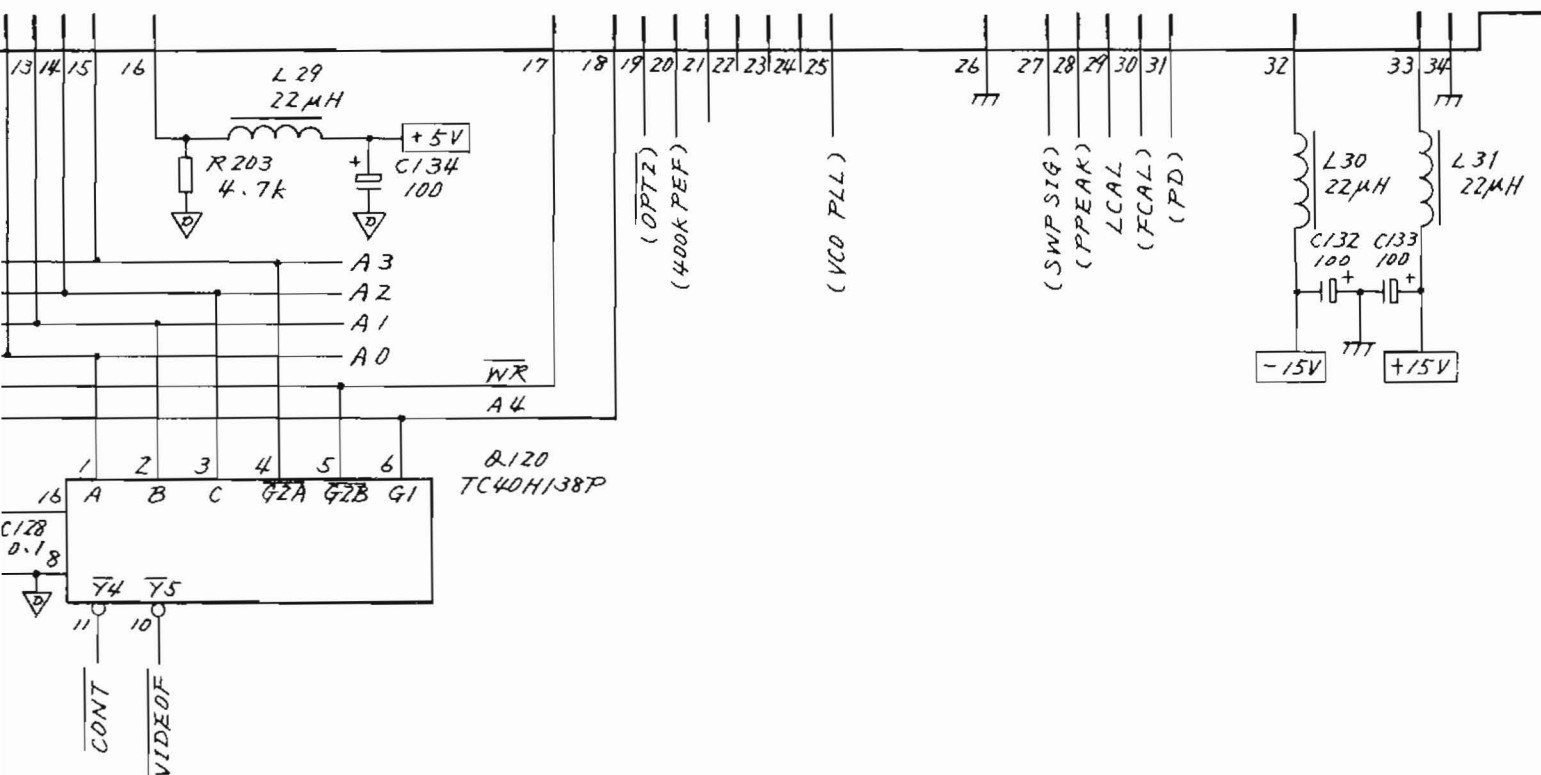


Fig. 5-64 (5/5)

Z25 LOG/LIN AMP DETECTOR  
Circuit Diagram (5/5)  
(43W 33956)

## 5.13 Z26 CPU Board

### 5.13.1 Circuit description - Z26

(Refer to Fig. 3-3 (3/4) and Fig. 5-71)

The microprocessor (main CPU) circuit, which analyzes the commands given by operation of the front panel switches and rotary encoder and determines the overall operation of the MS710[ ] by sending the necessary control signals, and a SWEEP GENERATOR circuit which generates sweep signals based on this control, are mounted on this PC board.

The Z26 circuit is divided into the 5 parts (A) to (E) shown in Fig. 5-71, and the circuit description for each part is as follows:

#### Part (A): CPU, ADDRESS DECODERS, ROMS, AND RAM

Q3 is an 8 bit microprocessor which is compatible with the Z80A and is operated by a 4 MHz clock. Q5, Q11, and Q12 are the address decoders, Q6, Q7, and Q8 are the firmware ROM, and Q9 is a 2 kbyte RAM. The main CPU address map is shown in Table 5-3.

Q16 is an I/O port which outputs the RF ATT/SW control signal and other signals. The signals input and output by the main CPU are also summarized in Table 5-3.

#### Part (B): CLOCK OSC AND I/O PORTS

Z1 is an 16 MHz crystal oscillator. Its output is divided by 1/4 by Q24 to get 4 MHz clock signal. The 400 kHz clock signal, which is the 1/10 divided output of Q25, is used as the reference clock signal of the SWEEP GENERATOR circuit of Part (C), as well as the LSI clock signal of the Q38 keyboard display controller.

The main CPU sends the control signals to the Z21 to Z25 PC boards, as well as performing control signal input/output with the circuits on the Z26 PC board. Q20 and Q21 are buffer which sends the address and data signals for this purpose.

Moreover, the 16 MHz signal is  $1/N$  divided ( $N$  is an integer number from 16 to 47 determined by the CPU according to the 1st local frequency) by programmable divider Q27 and Q28 and sent to the SUB PLL circuit as a  $16 \text{ MHz}/N$  signal through J8. (See Figs. 3-3 (3/4) and 3-3 (4/4).)

Q32 is a flip flop circuit which stores interrupt requests from the SWEEP GENERATOR circuit, the front panel rotary encoder rotation detection circuit, and the sub CPU of Z34.

Parts (C) and (D): SWEEP GENERATOR and SWEEP START/STOP CONTROL

Parts (C) and (D) are the circuit which generates the sweep signal. Q43 and Q44 are the latch which receives the control data from the CPU, and Q45 to Q48 are each a 4-bit programmable counter and operate as a total 16-bit programmable divider. Q49 and Q50 operate as a 12-bit binary counter.

Q51, Q52, and Q53 are the data selectors for selecting the data which is set at the Q54 of 12 bit current output D/A converter. Q61 is a dual OP AMP which converts the Q54 D/A output current to a voltage, and performs level shifting, and produces the sweep signal.

The circuit consisting of Q55 to Q60 of Part (D) is a logic circuit which controls start/stop of the sweep signal. Q63 and Q64 are the trigger signal selection circuit and Q41 latches the signal sent from the CPU to control the SWEEP GENERATOR circuit, Parts (C) and (D).

The operation of the sweep signal generation circuit of the MS710[ ] is divided into the following three types, depending on the sweep setting condition.

- Type 1: Full sweep width at START/STOP mode exceeds 2 GHz.
- Type 2: Full sweep width at START/STOP mode is 2 GHz or less, or when sweep speed at CENTER/SPAN mode is 2 ms/div to 10 s/div.
- Type 3: Sweep speed at ZERO SPAN is 2  $\mu$ s/div to 1 ms/div (Sweep speed 2 ms/div to 10 s/div at ZERO SPAN becomes type (2).)

#### Type 1

In this type of operation, this sweep generator circuit is used only to produce the DSPC signal which shows the waveform sampling timing. Frequency sweep is performed by directly controlling the MAIN TUNE D/A converter in Z21 local control 1 from the CPU. (See paragraph 5.9.)

The simplified composition of the SWEEP GENERATOR circuit in this case is shown in Fig. 5-65. The data is set from the CPU so that the DSPC signal is output at each frequency change corresponding to 1/500 of one sweep matched to the MAIN TUNE D/A data setting.

#### Type 2

The simplified sweep generator circuit composition is shown in Fig. 5-66 (1/2). After the 400 kHz reference clock signal (SWPCLK) is divided by 1/D by a programmable divider in accordance with data D set from the CPU, it is input to a 12-bit binary counter.

The output of the counter is input to a D/A converter through a data selector. Therefore, when the CLEAR signal is reset by the sweep trigger and the counter begins to count the divided SWPCLK, the D/A output begins to rise in the form of a small staircase. The counter output is monitored by the SWEEP END detection logic circuit. When it reaches 4064 counts, it is reset to 0 and the D/A output also returns to 0.



The D/A output sawtooth waveform produced in this manner is used as the sweep signal. Since the sweep time is determined by the period of the 1/D divider output which is input to the counter, it can be accurately controlled by changing the value of D with the CPU.

The DSPC signal which shows the timing at which the Z34 digital memory/GP-IB circuit samples the waveform data is output each time the counter output changes 8 times. Therefore, the sampling signal for a total of  $4064/8 = 508$  points is output at one sweep period. Of these, the 501 points (corresponding to 500 sample periods or 4000 counts) from the 6th to the 506th are displayed on the CRT screen. Therefore, the relationship between sweep time (ST ms/div) and division data D is exactly equal and becomes  $D=ST$ .

### Type 3

The sweep signal generation circuit for 2  $\mu$ s/div to 1 ms/div is outlined in Fig. 5-66 (2/2). Operation when the trigger is FREE RUN is described below. Q54 (D/A converter) operates as a constant current source that is programmable by CPU. Its output is converted to a sawtooth wave voltage by the integrator consisting of Q61 and C21. The integrator output (TP1 voltage) enters window comparator Q63. COMP1 detects the point at which the sweep voltage (TP1) exceeds +1 V and generates the signal (BNKAF) which turns on the sweep LED at this time. COMP2 detects the point at which the sweep voltage (TP1) reaches +5 V and generates the signal which resets the sweep ( $\overline{SWPEF}$ ).

When the COMP2 output ( $\overline{SWPEF}$ ) becomes LOW, the  $\overline{FSRDY}$  pulse ( $\tau$  width = 20  $\mu$ s) is generated from Q75 monostable multivibrator 1 and the CLEAR (sweep reset) signal becomes HIGH. When CLEAR becomes HIGH, analog switch Q59 is switched, the charge across C21 of the integrator is discharged through R22,

and the sweep voltage (TP1) returns to 0. Monostable multivibrator 2 is operated by the rising edge at the end of  $\overline{\text{FSRDY}}$  and the next sweep trigger signal is generated (width: 3  $\mu\text{s}$ ). This trigger signal resets the flip-flop consisting of Q56 through switch Q64, the CLEAR signal returns to LOW, the integrator integrates the D/A converter output current again, and the sweep voltage (TP1) rises toward +5 V from 0 V. (When not FREE RUN, restarts if a separate trigger signal enters from switch Q64.)

Sweep is performed by repeating the above. To change the sweep time, the D/A converter set value is changed and the D/A output current is changed. (The sweep time becomes faster as the current becomes larger.) The relationship between data D set from the CPU and the sweep time (ST  $\mu\text{s}/\text{div}$ ) is

$$D = 8000/\text{ST}$$

In this sweep mode, since the waveform data is not sampled (digitalized), the DSPC signal is not output. The TP1 sweep signal passes through level shift circuit Q62, becomes the CRTSWP signal (0 to +4 V), and is sent to the Z27 display control PC board. At Z27, the signal passes through analog switch Q67, becomes the X-OUT signal and is sent to CRT BIAS/X-Y AMP of Z30 as the CRT horizontal axis signal. (Refer to Fig. 5-75.)

Part (E): INTERFACE

The main CPU performs data communication with the DISPLAY RAM in Z27 display control and Z34 digital memory/GP-IB. Q70, Q71, and Q72 switch the address bus and data bus for this purpose.

5.13.2 Checking procedure - Z26

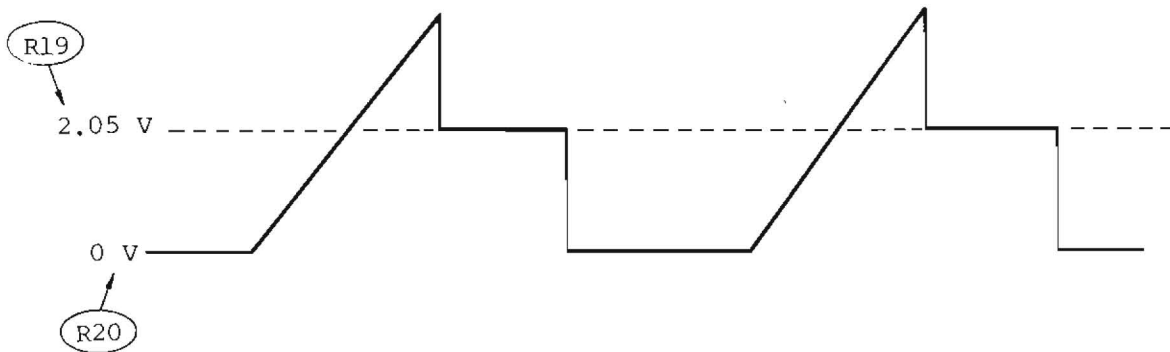
Step	Procedure
1.	Remove the top cover and the PC board cover plate (15) . See Figs. 2-1 and 2-5.
2.	Remove the Z26 PC board by pulling it up. Insert the service kit extender board and attach the Z26 PC board. Replace cable J51 connecting Z26 and Z21 to Z25 with the service kit extender cable.
3.	Turn on the MS710[ ] power switch.
4.	Check that the clock signals of checkpoints ① , ② , and ③ are normal (Refer to Fig. 5-68 for the waveforms of ② and ③ ).
5.	Set the MS710C sweep time to 2 ms/div.
6.	Measure the waveforms of TP1, TP2, CLEAR ④ , and BNKA ⑤ . If they are as shown in Fig. 5-69, operations are normal.
7.	Set the MS710[ ] to ZERO SPAN and the sweep time to 2 $\mu$ s/div.

(cont.)

Step	Procedure
8.	Measure the waveforms of TRG ⑥ , FSRDY ⑦ , TP1, and BNKA ⑤ . If they are as shown in Fig. 5-70, operations are normal.
9.	<p>To check the 16 MHz/N signal to the SUB PLL circuit (Refer to paragraph 5.7 of Z16 PLL block), remove the aluminum shield case on the Z26 PC board and measure the REF ⑧ frequency using a frequency counter.</p> <p>Operations are normal if <math>f_{REF} = 16,000/27 = 592.592</math> kHz at N=27 when the center frequency is set to 3 GHz. Also, <math>f_{REF} = 16,000/20 = 800.000</math> kHz at N = 20 when the center frequency is set to 100 MHz.</p> <p>Table 4-1 shows the relationship of the first local frequency and N.</p>

### 5.13.3 Adjustment Procedure - Z26

Step	Procedure
1.	Adjust R11 so as to be VREF (between Q62-1 and analog ground, at Part (C)) = 6.00 V.
2.	Set the SWEEP TIME to 2 ms/div. Adjust OFFSET R20 and AMPLITUDE R19 as shown in the following figure while observing the waveform at (TP1) on the oscilloscope (0.5 V/div.).



3. Adjust OFFSET R34 as shown in the following figure while observing the waveform at (TP2) on the oscilloscope (10 mV/div.).

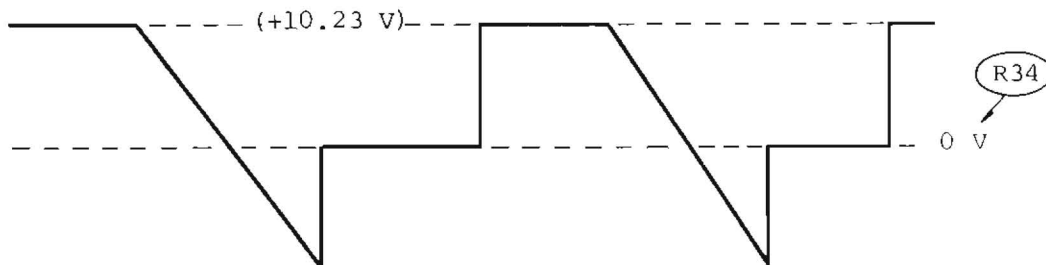


Table 5-3 Main CPU Address Map

ADDRESS	ROM/RAM
0000	ROM 1 (16K)
2000	ROM 2 (16K)
4000	ROM 3 (16K)
6000	RAM (8K)
8000	DISPLAY RAM (2K)
A000	MARKER RAM (1K)
C000	I/O Port
D000	
E000	
E800	
F000	
FFFF	

## I/O Port

ADDRESS	Port Name	I/O	CONTROL	PKG
F000				
1	DMTL	O	MAIN TUNE D/A L	Z21 LOCAL CONTROL 1
2	DMTH	O	" H	
3	DFT1L	O	FINE TUNE D/A 1 L	
4	DFT1H	O	" H	
5	DFT2	O	FINE TUNE D/A 2	
6	DYTOC	O	YTO TUNE COMP.	
7	VCOT	O	M/N VCO TUNE D/A	
8	SPANDA	O	SPAN ATT D/A	
9	SMCNT	O	SWEEP MODE CONTROL	
A				
B	MDATAL	O	M/N LOOP : M L	
C	MDATAH	O	" : M H	
D	NCIFK	O		
E				
F				
F010	RES BW	O	RES BW	Z22 IF BPF/AMP 1
1	NBWGC	O	NARROW BW/GAIN	
2	WBWGC	O	WIDE BW/GAIN	
3	FGC	O	FINE GAIN	
F014	CONT	O	LOG/LIN	Z25 LOG/LIN AMP DETECTOR
5	VIDEOF	O	VIDEO FILTER	
6				
7				
F018				Z24 LOCAL CONTROL 2
9				
A				
B	OPTCL	O	DIVIDER L, S/H	
C	OPTCH	O	DIVIDER H,	
D				
E				
F				
F020	PANEL(0)	I/O	KEYBOARD, DISPLAY	Z26 CPU BOARD
1	" (1)	I/O	CONTROLLER 8279	
F040	NDAATA	O	M/N LOOP : N-1	
1	COMPCH	O	COMPARATOR CH	
2	COMPDA	O	" D/A	
3	SWPCNT	O	SWEEP CONTROL	
4	SWPTL	O	SWEEP TIME L	
5	SWPTH	O	" H	
6	BELL	O	BUZZER	
7	SW/ATT	O	SW/ATT CONTROL	
F060	FDSTS	I	READ STATUS	

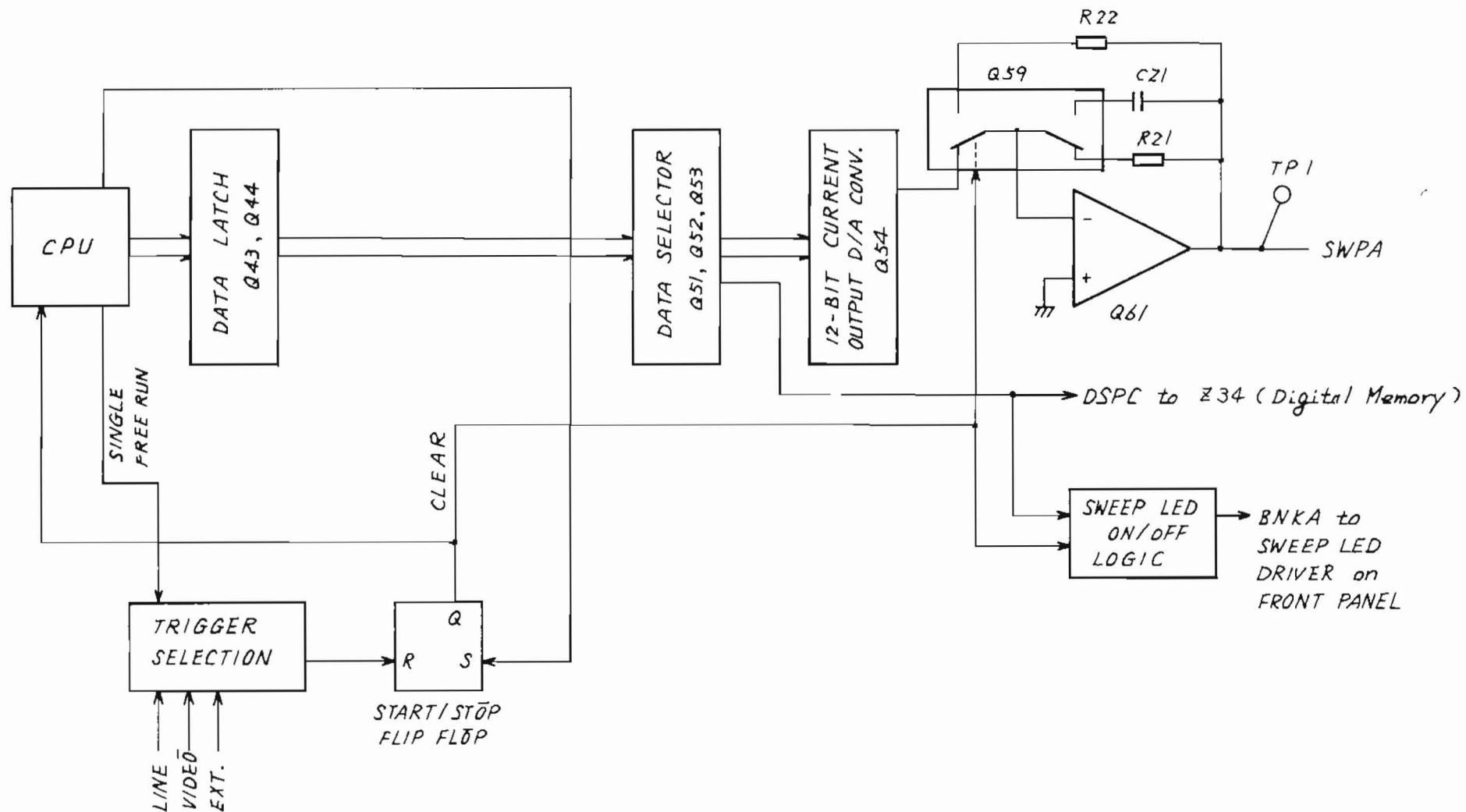
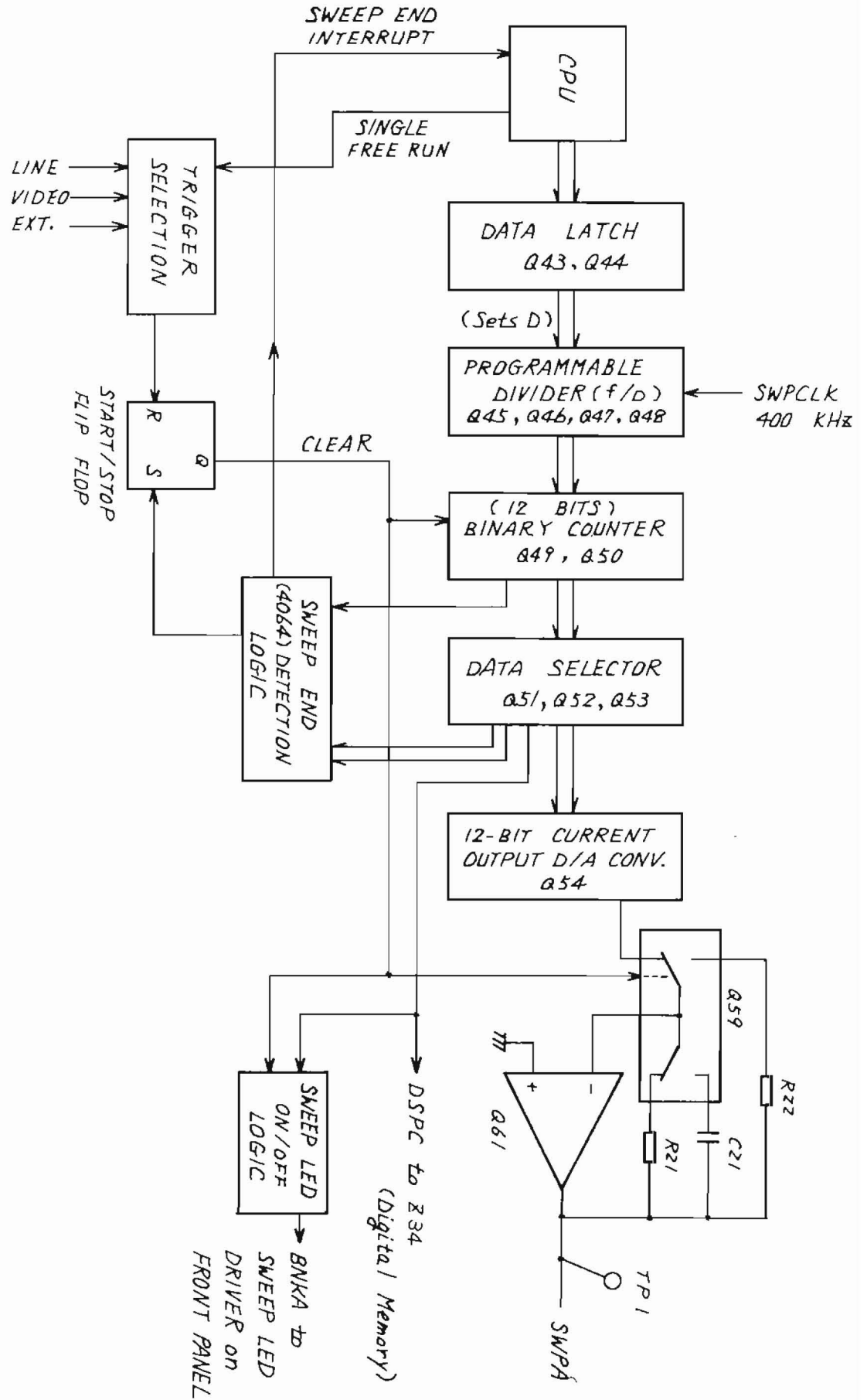
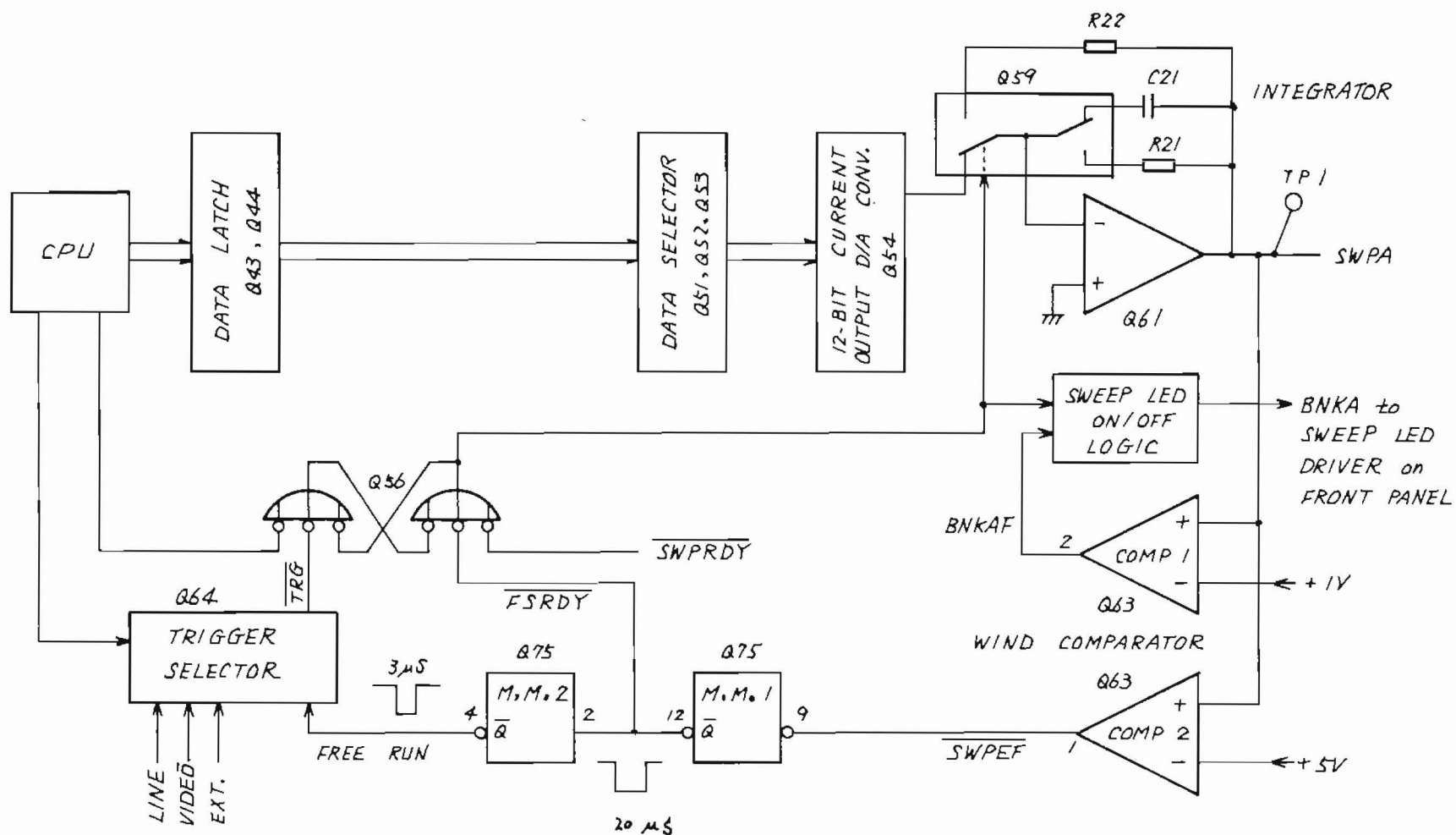


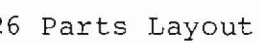
Fig. 5-65 Z26 CPU Board for SPAN &gt; 2 GHz

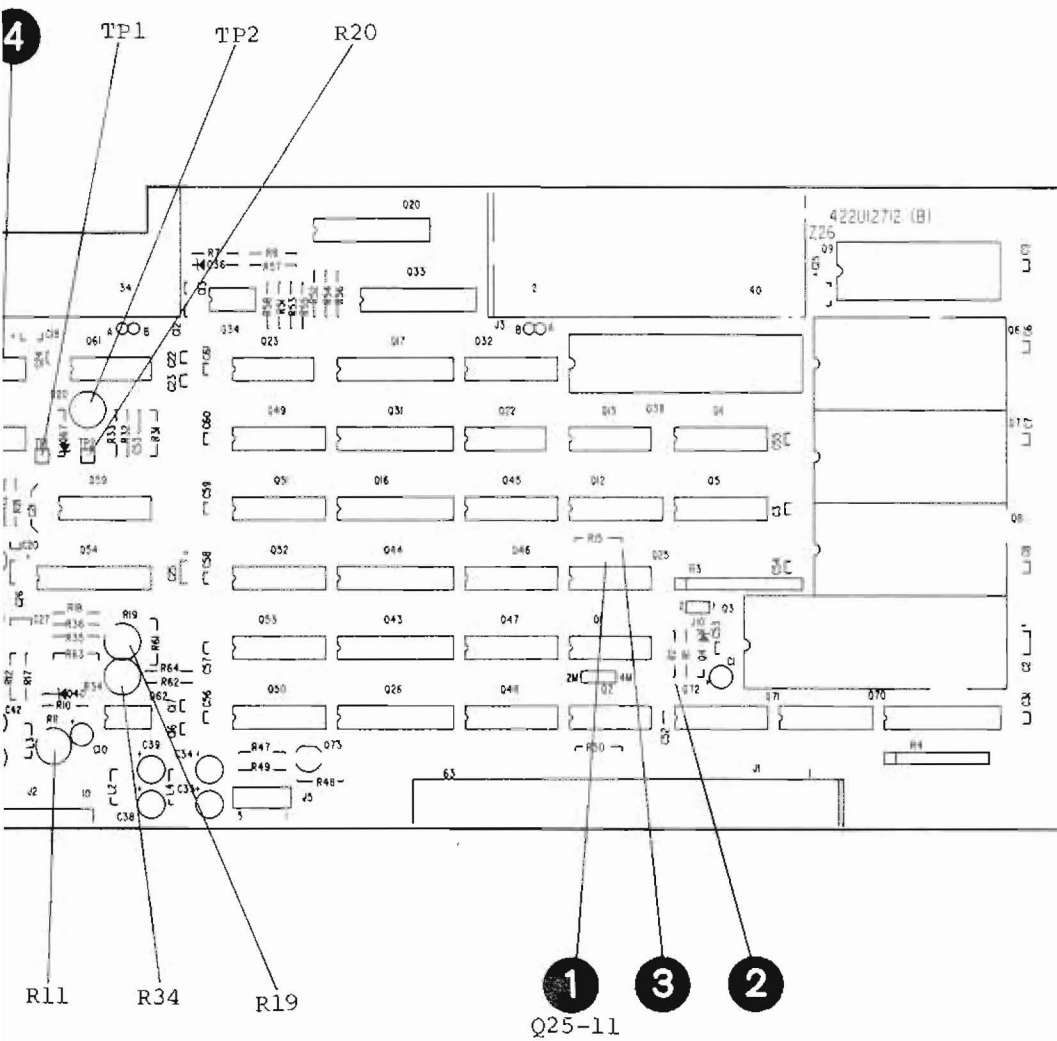
Fig. 5-66 (1/2) Z26 CPU Board for 2 ms/div to 10 s/div





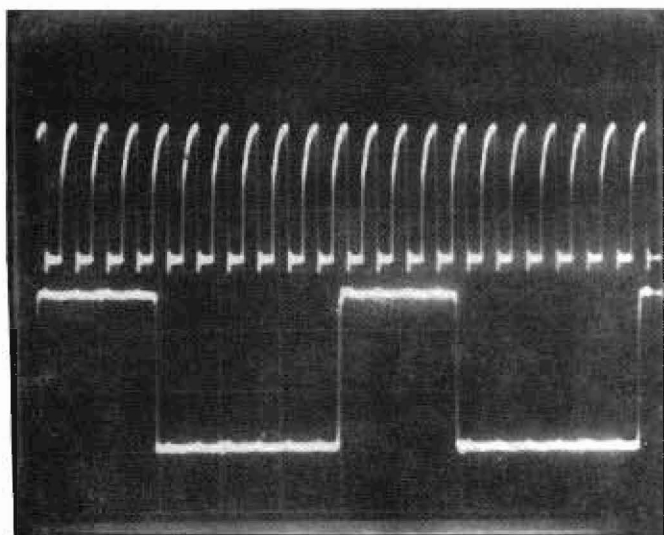
Fig. 5-66 (2/2) Z26 CPU Board for 2  $\mu$ s/div to 1 ms/div (Fast Sweep)





② /Z26  
CPU CLOCK  
(4 MHz)

(V)  
6  
4  
2  
0



(V) ③ /Z26  
6  
4  
2  
0  
SWP CLK  
(400 kHz)

HOR: 0.5  $\mu$ s/div

Fig. 5-68 Clock Signal for Z26 CPU Board

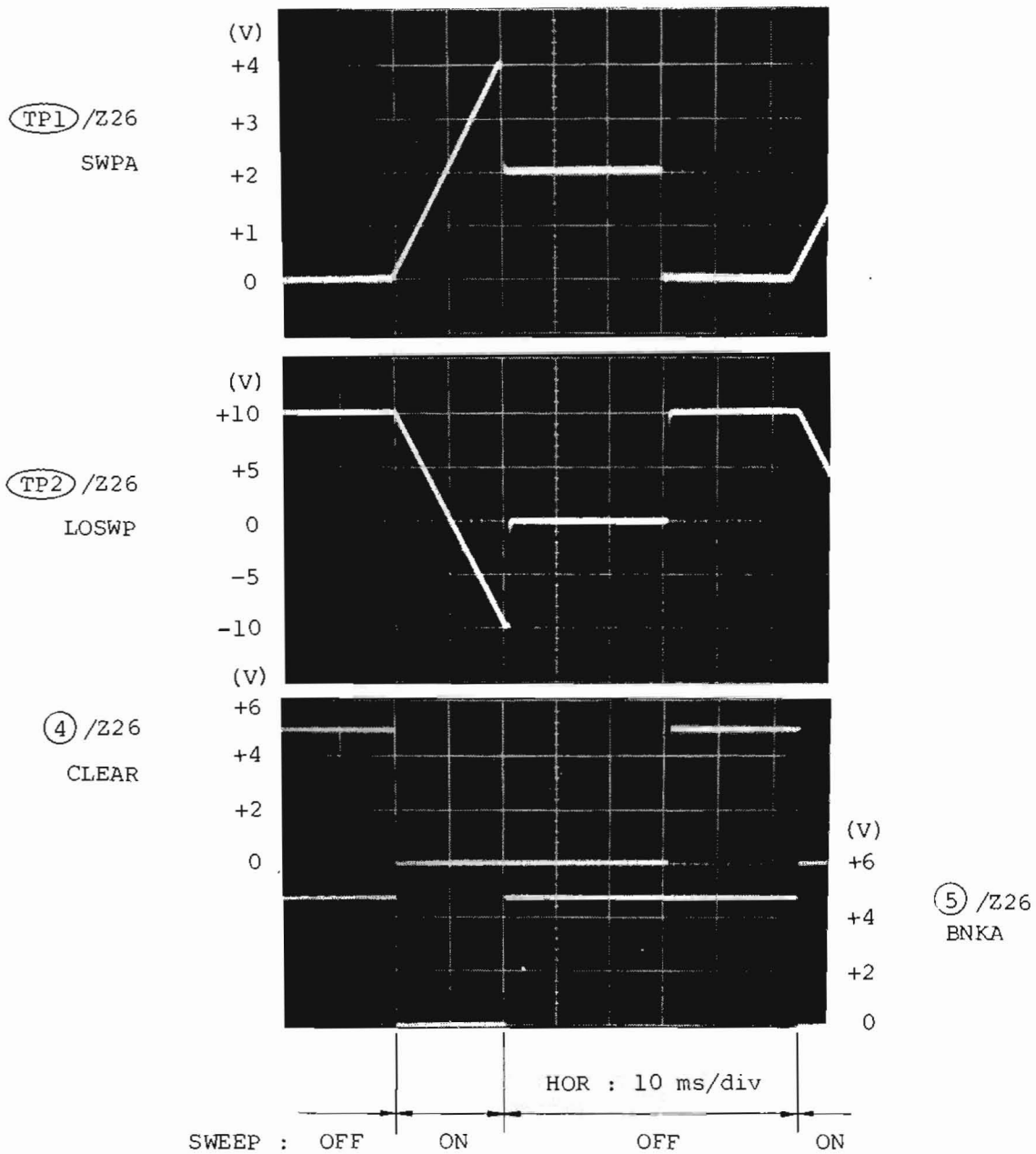


Fig. 5-69 Sweep Generator for 2 ms/div (FREE RUN)

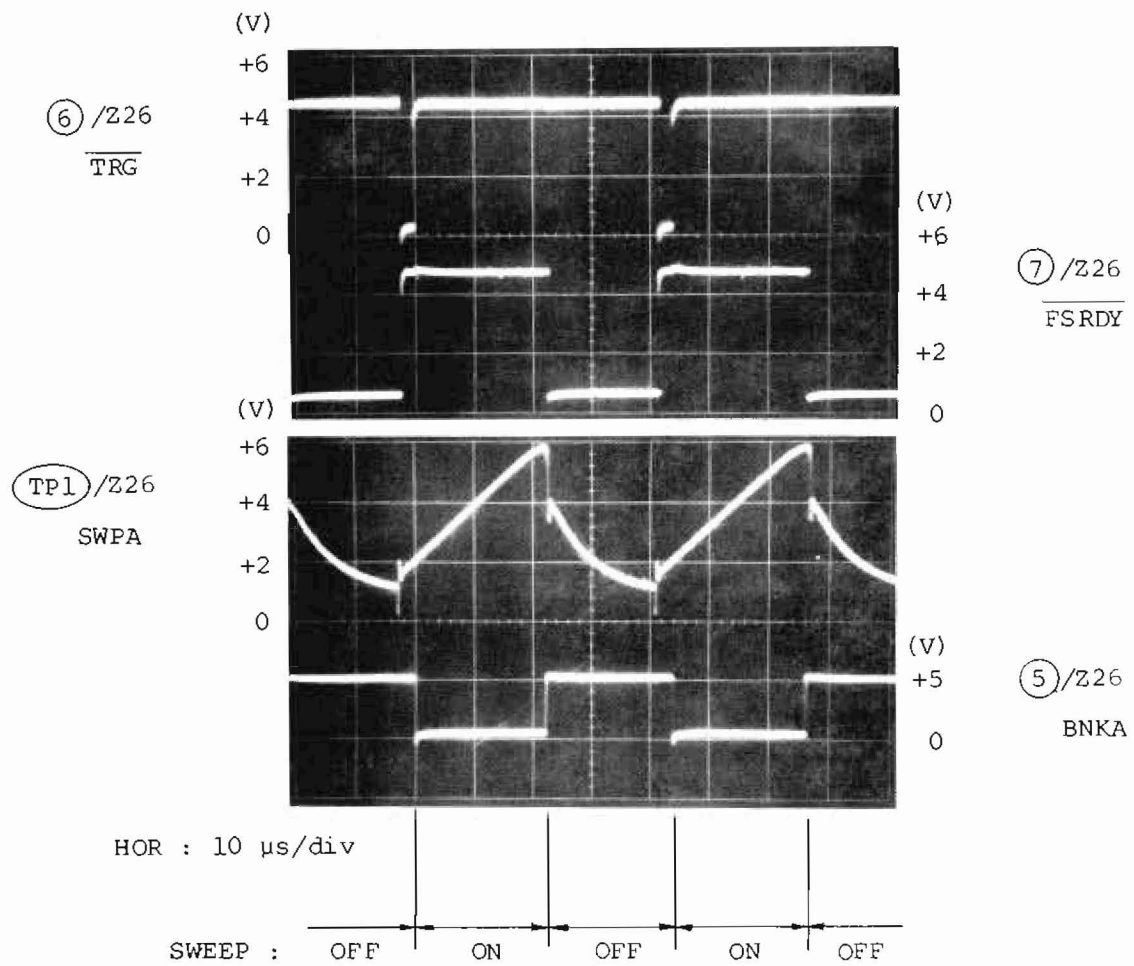
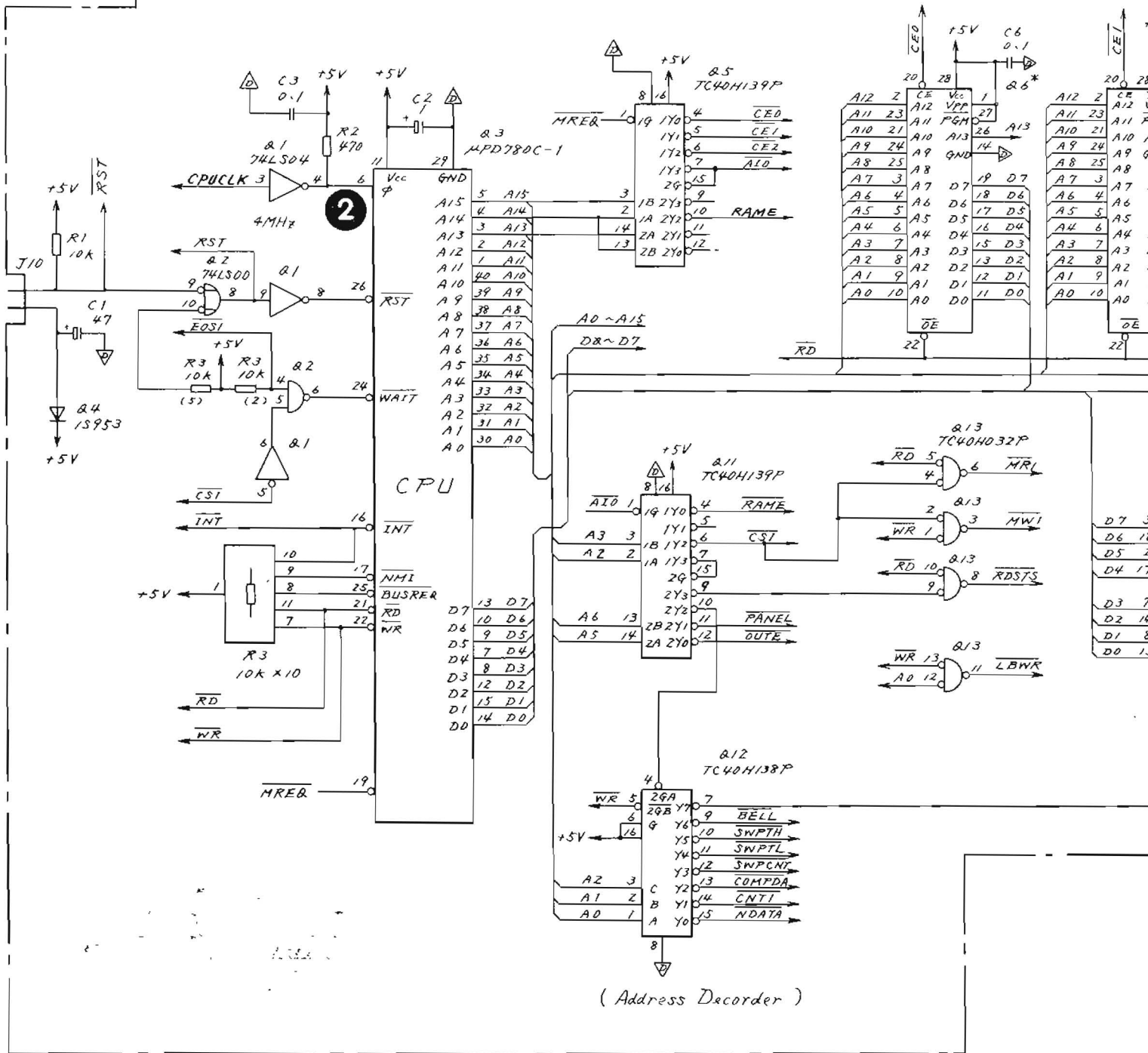


Fig. 5-70 Sweep Generator for 2  $\mu$ s/div (FREE RUN)

(A) CPU, ADDRESS DECODERS, ROMs, AND RAM

Q6~Q8 \* EPROM 16Kx8-25N



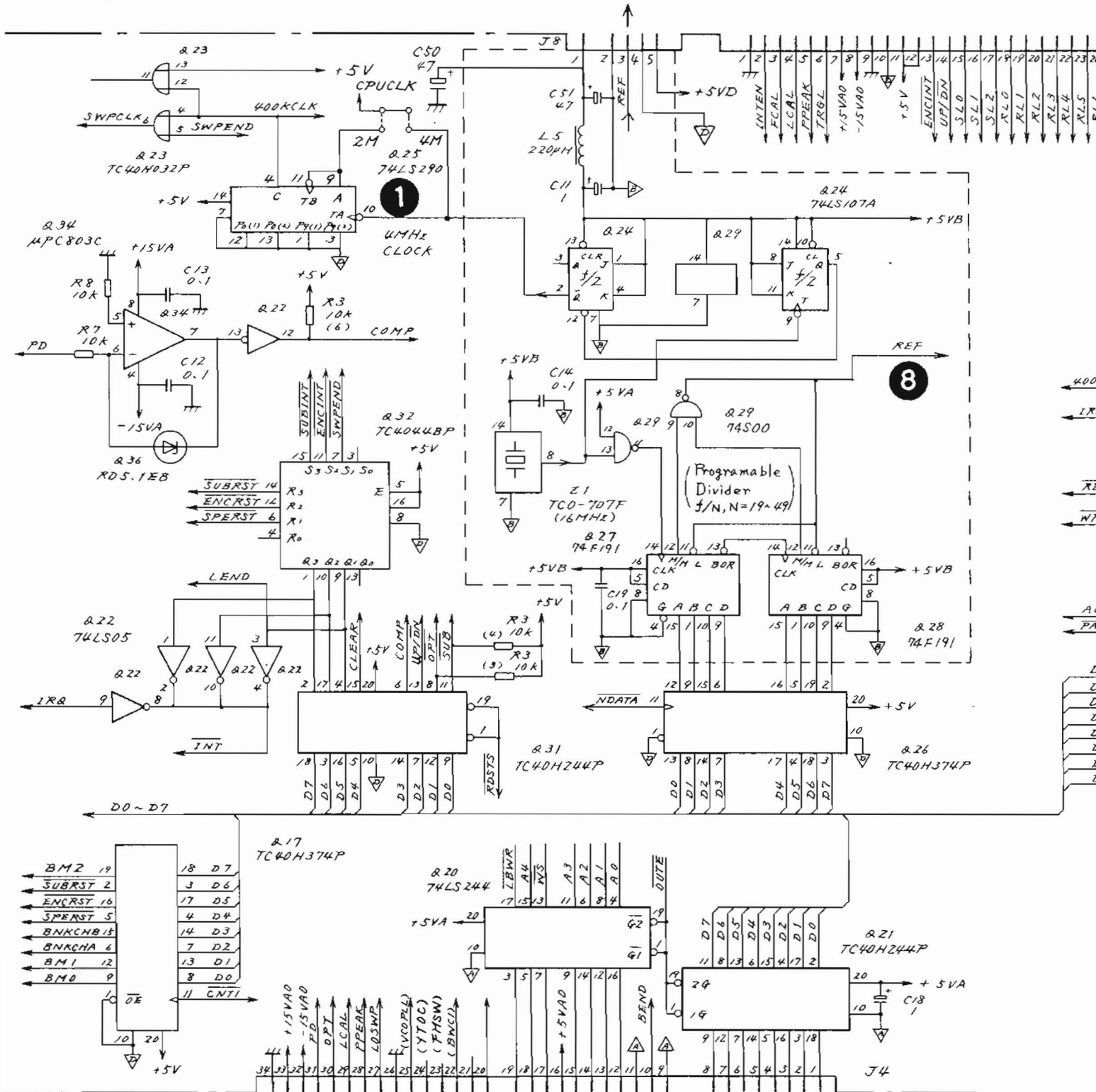
( Address Decoder )

5-209/(5-210 blank)



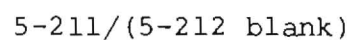
# ② CLOCK OSC AND I/O PORTS

16/N (MHz). N=16 to 47  
340.4 to 1000 KHz, TTL  
to Z16-J11

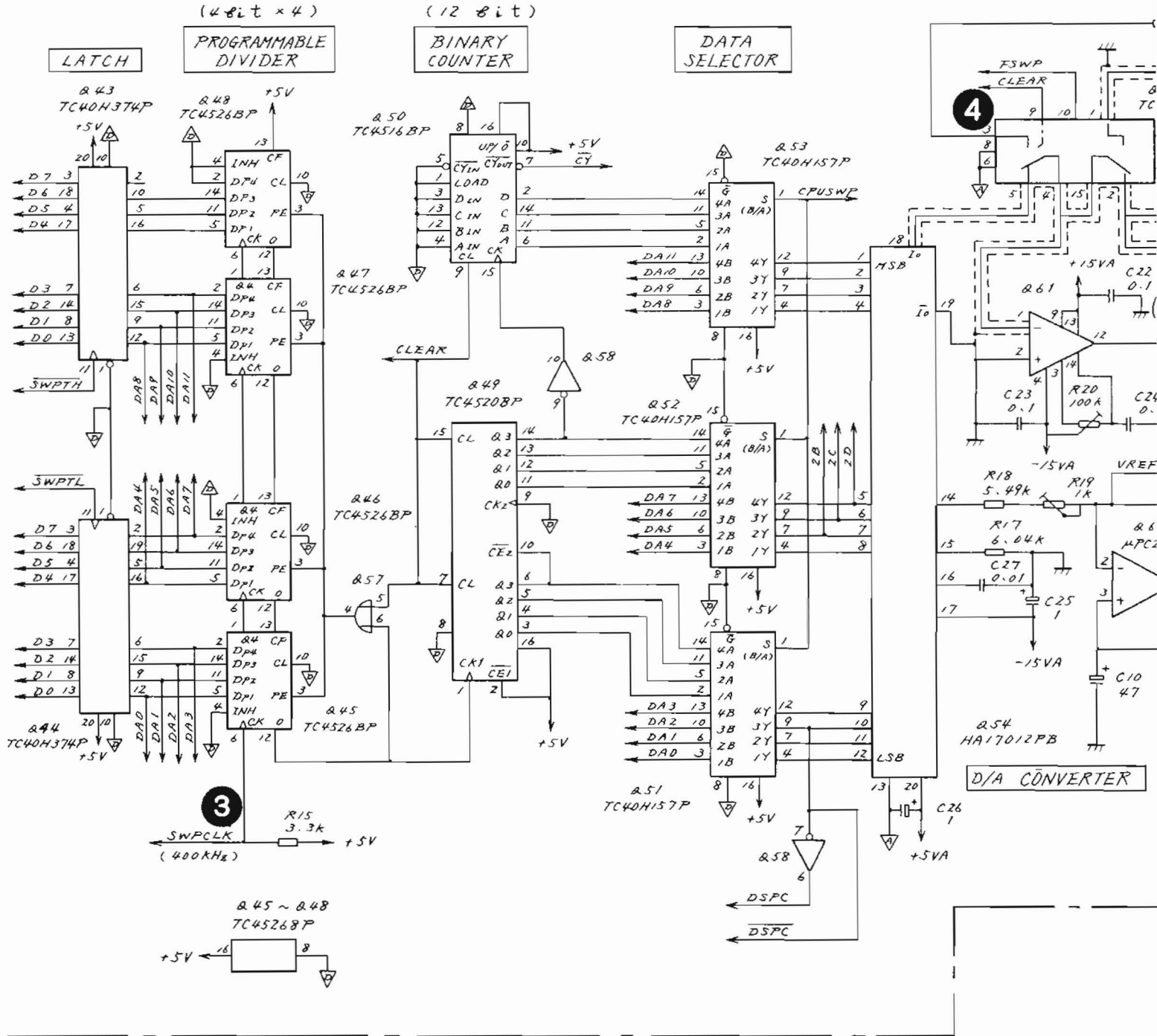


To Z21 (J9)  
Z22 (J4)  
Z25 (J5)

To Z1  
(Panel Control)



# ③ SWEEP GENERATOR



ATOR

(12 bit)

BINARY  
COUNTER

DATA  
SELECTOR

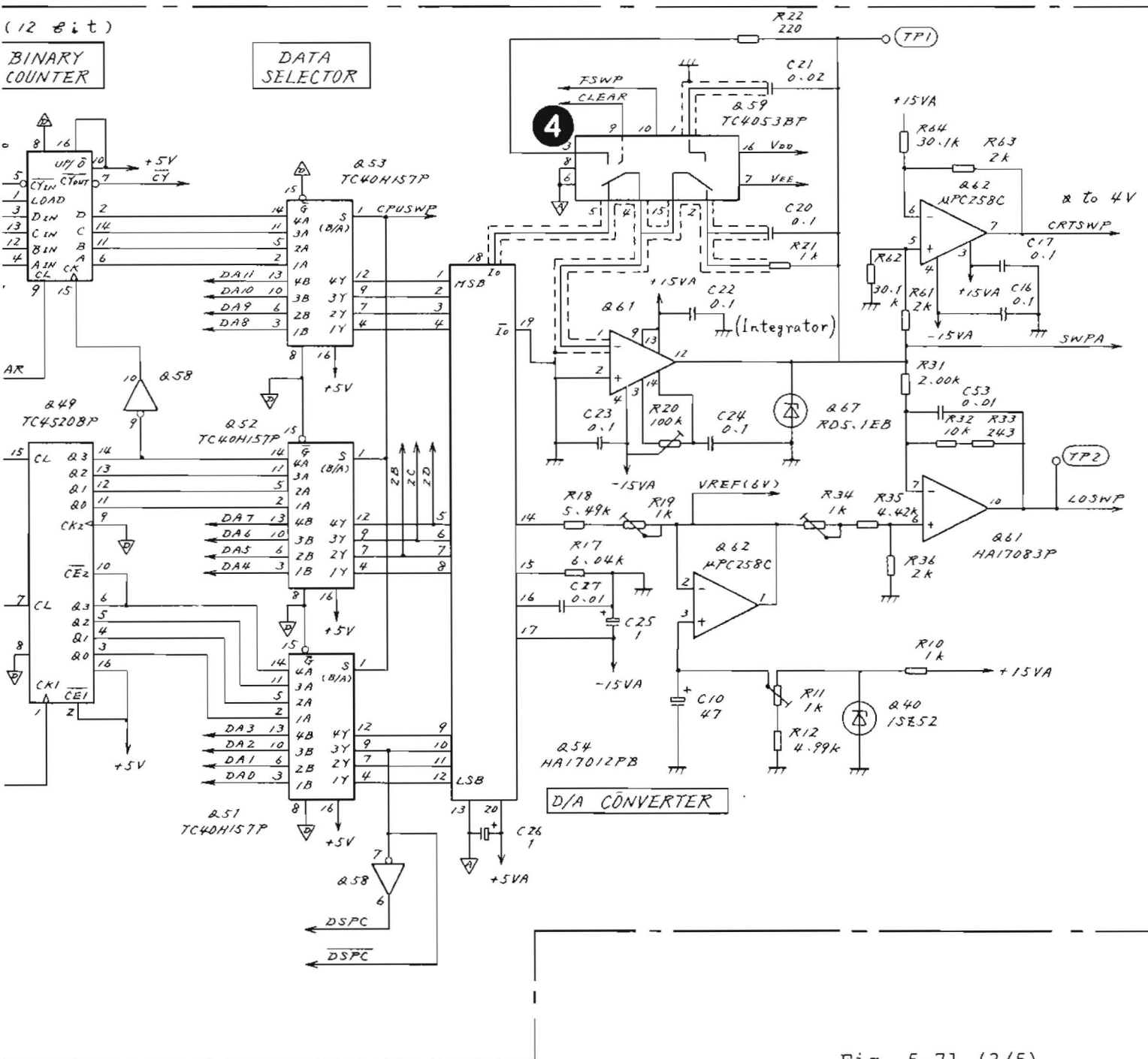
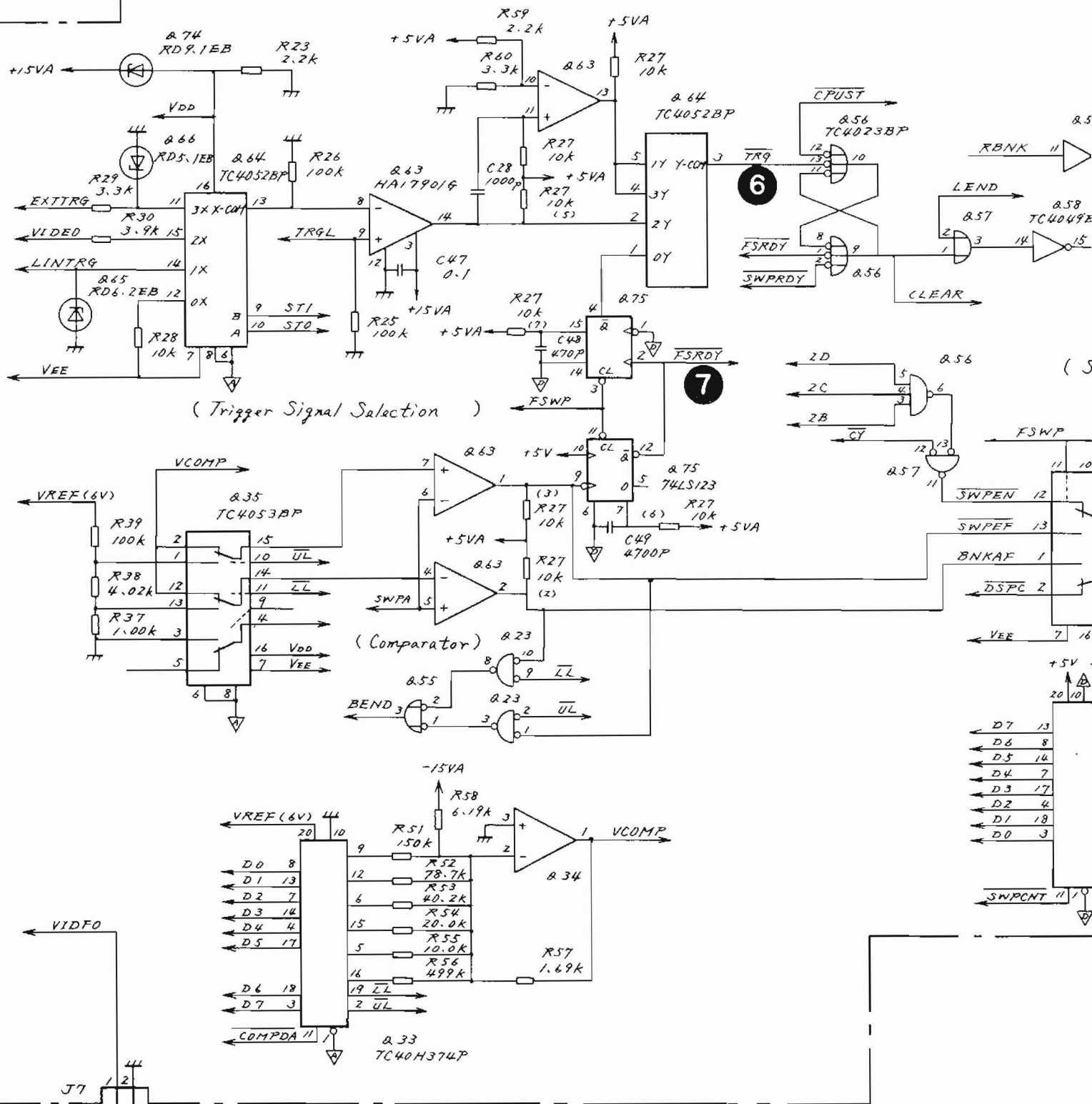


Fig. 5-71 (3/5)

Z26 CPU BOARD  
Circuit Diagram (3/5)  
(43W 33957)

5-213/(5-214 blank)

# ① SWEEP START/STOP CONTROL



# T/STOP CONTROL

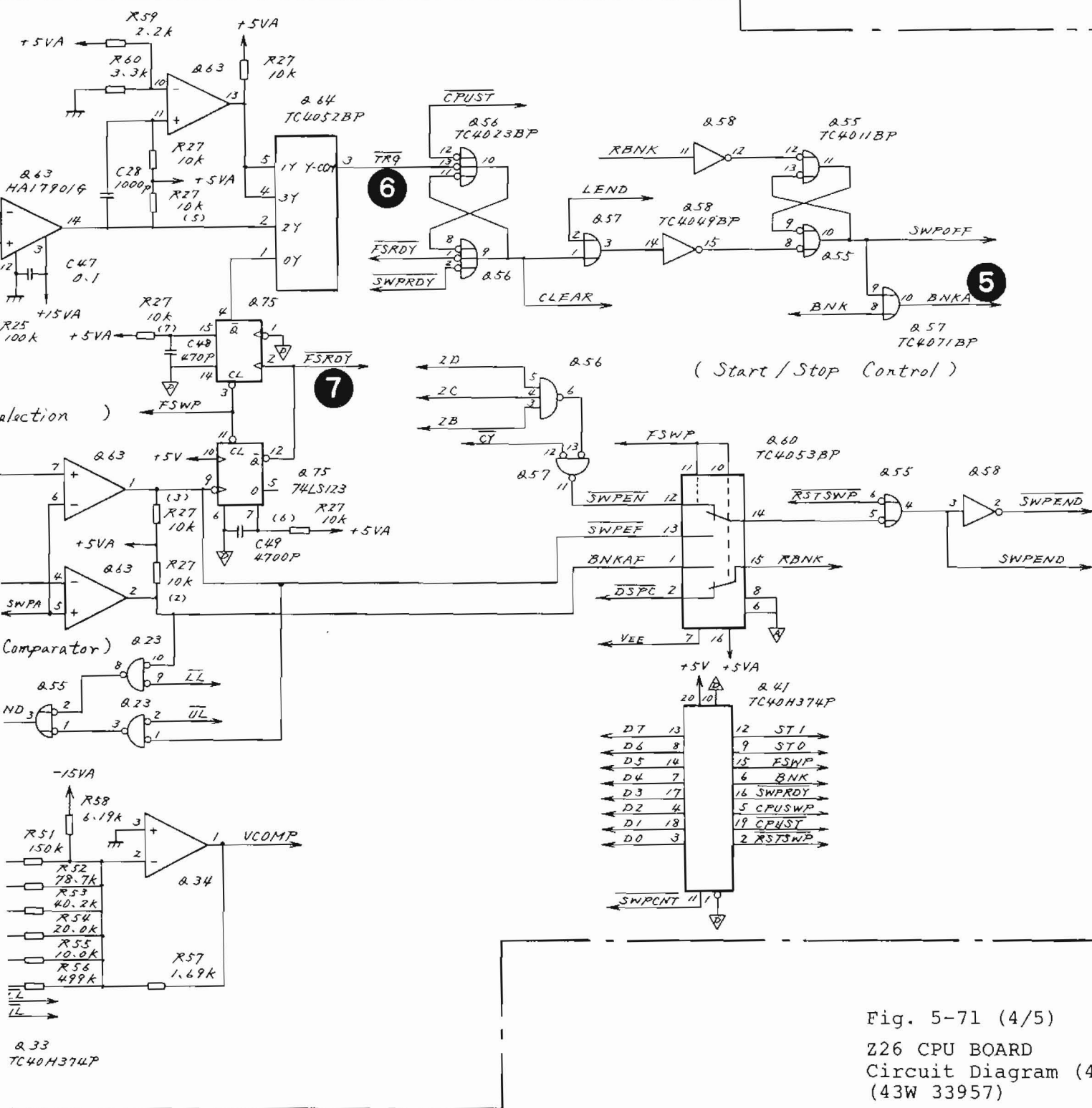
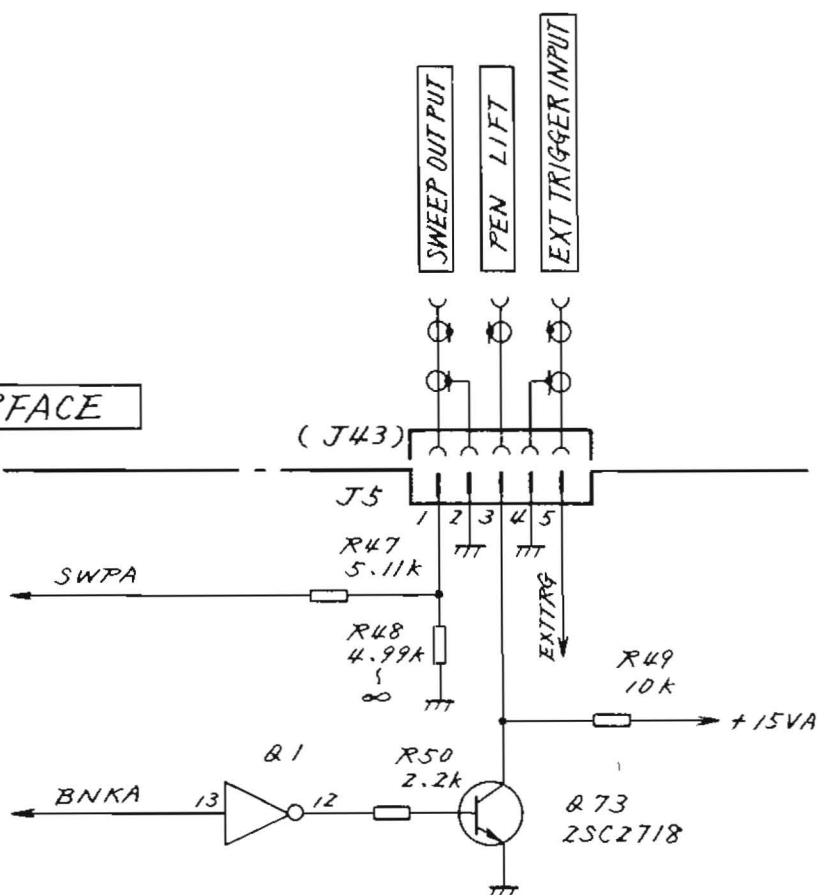


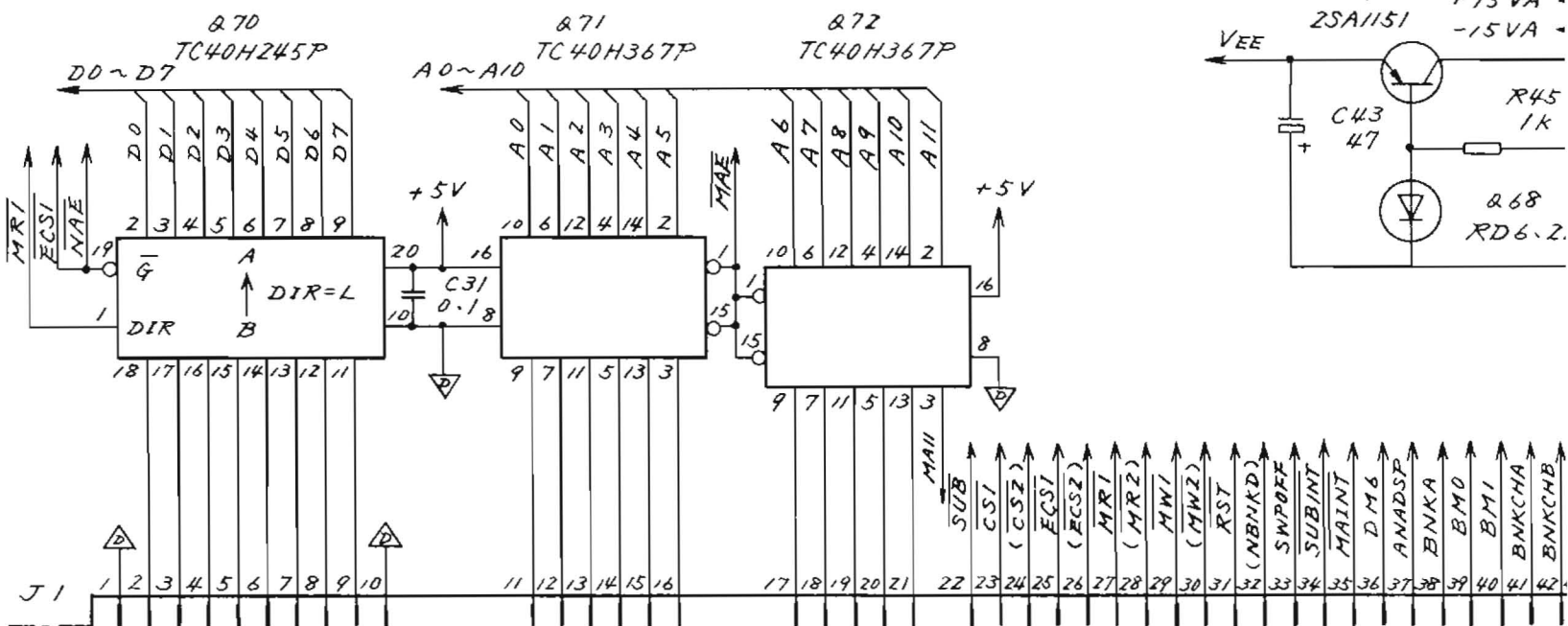
Fig. 5-71 (4/5)

Z26 CPU BOARD  
Circuit Diagram (4/5)  
(43W 33957)

(E) INTERFACE



C54  
C63  
0.1



To Z27-(J1)  
and Z34-(J1)





## 5.14 Z27 DISPLAY CONTROL

### 5.14.1 Circuit description - Z27

(Refer to Fig. 3-3 (3/4) and Fig. 5-82)

This PC board includes a display RAM with a battery backup to store the waveform data which is sampled and digitalized in the Z34 digital memory/GP-IB circuit.

This waveform data is used by the digital-to-analog conversion circuit that reads data from this RAM and reproduces the waveform data on the CRT.

This PC board also includes a circuit that displays graticules and characters in addition to the waveform data. The Z27 PC board circuit block diagram is shown in Fig. 5-72.

The Z27 circuit is divided into the 6 parts (A) to (F) shown in Fig. 5-82, and the circuit description is given for each part as follows:

#### Part (A): DISPLAY RAM AND ACCESS CONTROL

Q13 is the display RAM which has the 2 kbyte capacity and is the CMOS RAM with a battery backup. This RAM can be accessed from both the main CPU in Z26 and the sub CPU in Z34. It is used as a common RAM when data communication is performed between these CPUs.

The waveform data is written in this display RAM Q13 from the sub CPU in Z34. The character data codes to be displayed and the data that indicates the marker display positions are written by the main CPU in Z26.

The display RAM Q13 address map is listed in Table 5-4. Normally, the characters that indicate the measurement conditions, graticules (dot rows), and up to two waveform data items are displayed on the CRT.

These data items are arranged according to the display RAM address order listed in Table 5-4. Consequently, the above-mentioned display is performed by sequentially reading these data items, performing the required D/A conversion, and sending this data to the Z30 CRT bias/X-Y amplifier. The required character codes are written in a part of the waveform memory area by the main CPU for the SAVE/RECALL memory list display mode (DM6). They are sequentially read out so that character patterns can be created by using the character generator ROM. Then these patterns can be displayed on the CRT. The display sequence is shown in Fig. 5-73.

The basic timing clock signal used for this display sequence control is the 4.8 MHz clock signal (CK0) generated by X1 and Q1. Q2 is the dual 4-bit binary counter used to obtain clock signals CK1 to CK3 and AD0 to AD3 which has cycle time multiplied CK0 by the integer. These clock signals are shown in Fig. 5-76.

One of these signals is selected depending on display modes DM1 to DM4 and DM6, and is sent to the Q3 and Q4 counters.

The output of these counters are used as addresses (AC5 to AC14) to read data from the display RAM Q13.

Therefore, whenever AC5 varies, the access address in the display RAM is incremented by 1.

Whenever AC5 varies (whenever AC4 varies from H to L), the read control circuit consisting of the Q11, Q12, and Q15 (flip-flops and monostable multivibrators) operates and data is read from the display RAM and latched at Q16. The timing for this readout sequence is shown in Fig. 5-77.

## Part (B): TIMING CONTROL

The address data for the DISPLAY RAM are also sent to the display mode control logic circuit consisting of Q20 and Q21 to generate display mode status signals DM1/6, DM2, and DM3/4.

DM1 is the mode for displaying characters which show the measurement conditions. DM2 is the mode for displaying the graticule dot lines. DM3 and DM4 are modes for displaying the waveform data. DM6 is the mode for displaying characters which show the memory list in the SAVE/RECALL operation.

In any mode, X-Y drive signals for the desired CRT display are generated by the X and Y D/A converters in Part (C). The logic circuit in Part (B) generates latch timing signals for the input data of these D/A converters.

## Part (C): CHARACTER GENERATOR, DATA SELECTOR, AND D/A CONVERTERS

The data read from the display RAM are the character codes for DM1 and DM6. These data are used as the most significant 6-bit address of character generator ROM Q30. Because AC0 to AC4 are input to the least significant 5-bit address of the character generator, 32 addresses can be specified for one character display and data items CD0 to CD5 are output to generate character patterns.

The CD0 to CD5 signals are used to generate X-Y character pattern analog signals by using the D/A conversion circuit consisting of Q31 and Q32.

The data items corresponding to the X- and Y-axial direction character display positions are input to an X/Y D/A converter by the data selector using the address counter value. These data items are then converted into the corresponding analog signals.

These character pattern and character position signals are added by Q64 through the Q63 analog switch in Part D . Then they are converted into CRT driver input signals. In this case, offset signals used to determine display line spacing are also added to the Y-axial direction signals.

The data read from the display RAM Q13 indicates the positions of the X- and Y-axial direction graticules for DM2.

A single graticule is generated for each data item. The dot positions and blanking control signals used to create individual single scale line dots are generated in Part (B) by the Q17, Q18, and Q19 timing circuits according to the ROM Q22 information.

The data corresponding to the scale-line position is input to one of the X/Y DA converters.

The dot position information generated by Q22 is input to another X/Y D/A converter. Thus analog signals are generated corresponding to the scale-line dot patterns.

The marker Y-axial direction line is also created in the same way as the scale line during the final cycle of this DM2.

The data read from the display RAM Q13 is the waveform data for DM3/4. The least significant 2-bit data contained in the Z34 (digital memory/GP-IB PC board) is also added to this data and is input to the Y D/A converter through the data selector as a total of 10-bits of the waveform data.

At the same time, the address counter value that sequentially reflects the incremented X-axial direction positions for waveform data changes is selected and input to the X D/A converter by using the data selector.

Part (D): BLANKING CONTROL, LINE GENERATOR, SWITCH, AND  
ADDER

Because the Y D/A output in the mode DM3/4 represents the sampled waveform value, it is displayed as unconnected points when displayed as is. Therefore, to connect these points with a line, and reproduce the original analog waveform data, the Q65 and Q66 line generator circuits are used.

The analog X-Y signal needed in each display mode is selected by the switch and adder circuit Q63 and Q64 and then sent to the Z30 CRT BIAS/X-Y AMP PC board through connector J3.

The blanking control signals in all display modes are generated by the circuit consisting of Q40 to Q43 and are also sent to Z30.

Part (E): INTENSITY CONTROL

The intensity of the CRT display should be changed for each display mode. The circuit consisting of Q73 to Q75 generates this intensity control signal.

The regulator circuits for VDD and VEE which are used in the analog switches are also included in this Part (E).

Part (F): MEMORY ACCESS PRIORITY CONTROL

The DISPLAY RAM Q13 has to be accessed at random by the display control on this Z27, the main CPU on Z26, and the sub CPU on Z34. So, access priority control must be done to avoid data collision. The access request signals  $\overline{CS0}$ ,  $\overline{CS1}$ , and  $\overline{CS2}$  are latched in Q85 and checked by the Q86 priority encoder. Then an access enable signal from among  $\overline{ECS0}$ ,  $\overline{ECS1}$ , and  $\overline{ECS2}$  is returned to each part.

The priority for the display control circuit ( $\overline{CS0}$ ) is the highest and that for the sub CPU ( $\overline{CS2}$ ) is the lowest.

#### 5.14.2 Checking procedure - Z27

Step	Procedure
1.	Remove the top cover and the PC board cover plate ⑮ See Figs. 2-1 and 2-5.
2.	Remove the Z27 PC board by pulling it up. Insert the extender board and attach the Z27 PC board.
3.	Turn on the MS710C power switch.
4.	Observe the voltage waveforms of XOUT ① and YOUT ② using an oscilloscope. when they are as shown in Fig. 5-67, the operations from the input section to the Z27 PC board are assumed to be normal and the following checks are not required.
5.	Check that the 4.8 MHz reference clock $\overline{\text{CK0}}$ ③, the frequency-divided clocks $\overline{\text{CK1}}$ ④, and CK3 ⑤ obtained from the reference clock operate normally as shown in Fig. 5-76.
6.	Using an oscilloscope, check that Display RAM Readout timing circuit signals of checkpoints ⑥ to ⑪ operate normally as shown in Fig. 5-77.
7.	Check that the Display Mode Status signals DM1/2/6 ⑫ and DM3/4 ⑬ are as shown in Fig. 5-78.
8.	Using an oscilloscope, check that X output XC ⑭ and Y output YC ⑮ of the character generator are as shown in Fig. 5-79.

(cont.)

Step	Procedure
9.	Check that output XDA ⑯ of X-D/A and output YDA ⑰ of Y-D/A are as shown in Fig. 5-80.
10.	Check that the BLANKING CONTROL signal (H: BLANKING ON) BLANK ⑱ is as shown in Fig. 5-81.
11.	Turn the SCALE INTENSITY control knob on the front panel and check the voltage of ⑲ is as shown in Fig. 5-81.

#### 5.14.3 Adjustment - Z27

##### (1) Sensitivity and Offset Adjustment Procedure

Step	Procedure
1.	Connect DVM between TP1 and analog ground and adjust R34 so as to obtain +10.23 V.
2.	Adjust R37 so that the characters on the upper and lower position of the scale line are at a suitable position. (It is better to leave a larger space between the lower characters and the bottom scale line than a space between the upper characters and the top scale line.)  If the space between the upper or lower characters and the top or bottom scale line is too small to observe the scale, make R58 (6.81 k $\Omega$ ) smaller to spread the space.

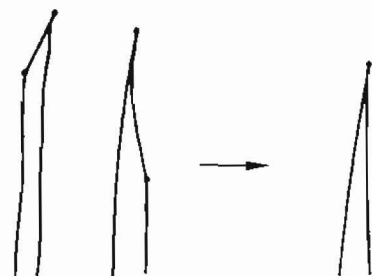
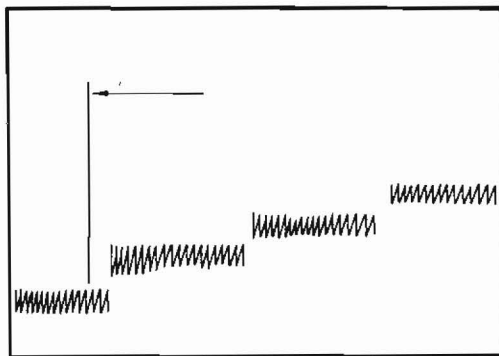
(cont.)

Step	Procedure
3.	Disconnect the video signal line between Z25-J3 and Z26-J7. (Disconnection at Z25-J3 is easy.)
4.	Under this condition (Video voltage = 0 V), write NORMAL to both A and B memories.
5.	As the contents of the A and B memories are equal by step 4 above, (A - B) will be 0. (The effect of offset of the sampling system can be canceled in this way.)
6.	Push the DISPLAY (A - B) key and set REF LINE on the screen to bottom. Set the offset with R36 in Z27 so that a trace display which is now a horizontal line coincides with the bottom scale line. (It is possible to perform this adjustment without lifting the printed board.)
7.	Push the DISPLAY (A - B) key and set REF LINE on the screen to top. Set sensitivity with R35 in Z27 so that the trace display coincides with the top scale line.
8.	Push the DISPLAY (A - B) key and set REF LINE on the screen to middle. Confirm that the trace display coincides with the center scale line.



## (2) Marker Level Indication Adjustment Procedure

Step	Procedure
1.	Press the 1.7 G - 23 GHz FREQ BAND switch to reset.
2.	Send a signal in a frequency range of 2 GHz to 23 GHz, level approx. 0 dBm so that a single spectrum is indicated.
3.	Set WRITE to OFF to hold the waveform.
4.	Show the marker with SHIFT + CENTER FREQ.
5.	Overlap the marker with the spectrum.
6.	Adjust R43 so that the marker indication level coincides with the peak point of the spectrum line.



Note: If the displayed spectrum trace is not sharp and clear or is divided into two lines, adjust the frequency so that the trace converges into a single line.

5-228

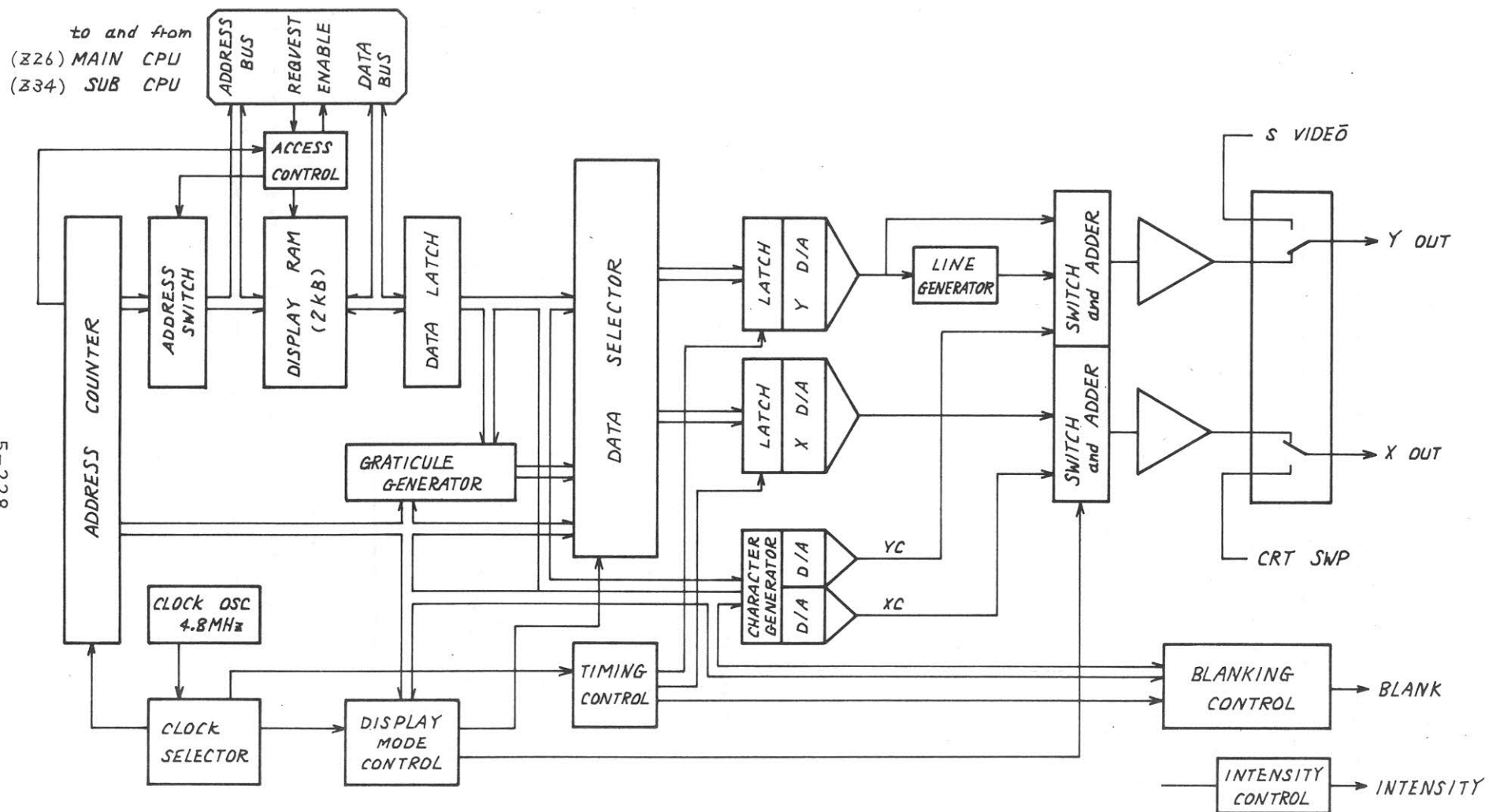
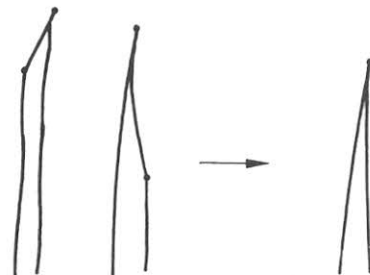
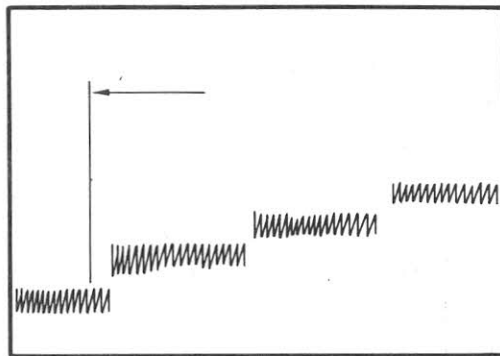


Fig. 5-72 Z27 Display Control Simplified Block Diagram

## (2) Marker Level Indication Adjustment Procedure

Step	Procedure
1.	Press the 1.7 G - 23 GHz FREQ BAND switch to reset.
2.	Send a signal in a frequency range of 2 GHz to 23 GHz, level approx. 0 dBm so that a single spectrum is indicated.
3.	Set WRITE to OFF to hold the waveform.
4.	Show the marker with SHIFT + CENTER FREQ.
5.	Overlap the marker with the spectrum.
6.	Adjust R43 so that the marker indication level coincides with the peak point of the spectrum line.



Note: If the displayed spectrum trace is not sharp and clear or is divided into two lines, adjust the frequency so that the trace converges into a single line.

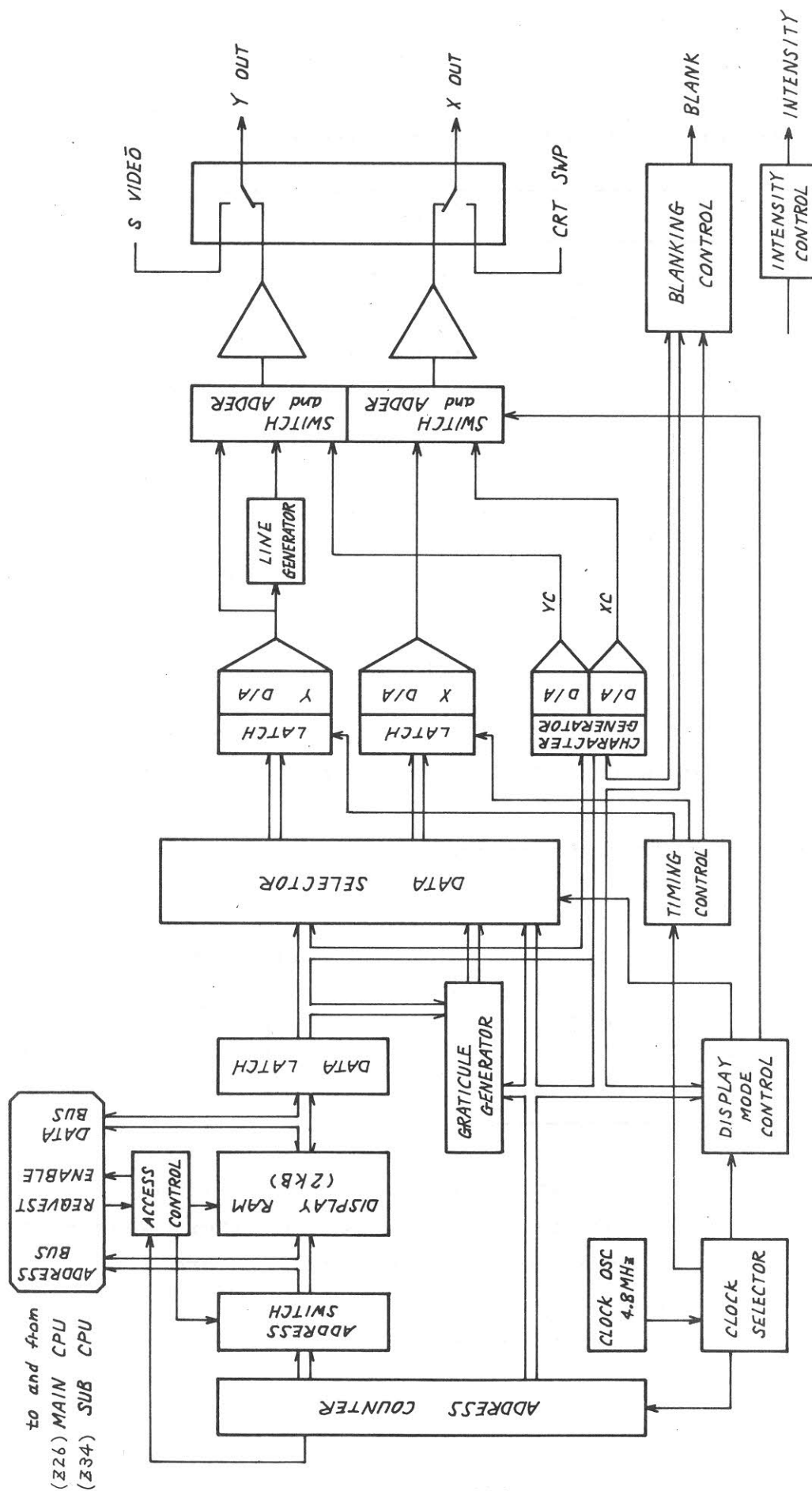


Fig. 5-72 Z27 Display Control Simplified Block Diagram

Table 5-4 Q13 DISPLAY RAM ADDRESS MAP

DM3/4	2047	7FF	BLANKING AREA	
	2043	7FB		
	2042	7FA		
	1542	606		
DM3	1541	605	BLANKING AREA	
	1531	5FB		
	1530	5FA	CH-A TRACE DATA	
	1030	406		
	1029	405		BLANKING AREA
	1024	400		
DM2	1023	3FF	COMMON RAM AREA for MAIN and SUB CPU	
	288	120		
	287	11F		
	256	100	MARKER POSITION DATA GRATICULE POSITION DATA	
	255	0FF		
	192	0C0		
DM1	191	0BF	CHARACTER CODE LINE 2	
	128	080	CHARACTER CODE LINE 3	
	127	07F		
	64	040	CHARACTER CODE LINE 4	
	63	03F		
	0	000		
MODE	DECIMAL	HEX	DATA	
	ADDRESS			

for NORMAL DISPLAY

	2047   1792   1791   1728   1727   1152   1151   1088   1087   1024   1023   0	7FF   700   6FF   6C0   6BF   480   47F   440   43F   400   3FF   000	NOT USED
DM6			CHARACTER CODE    LINE 1
			CHARACTER CODE    LINE 11
			CHARACTER CODE    LINE 12
MODE	DECIMAL	HEX	DATA
	ADDRESS		

for MEMORY LIST DISPLAY



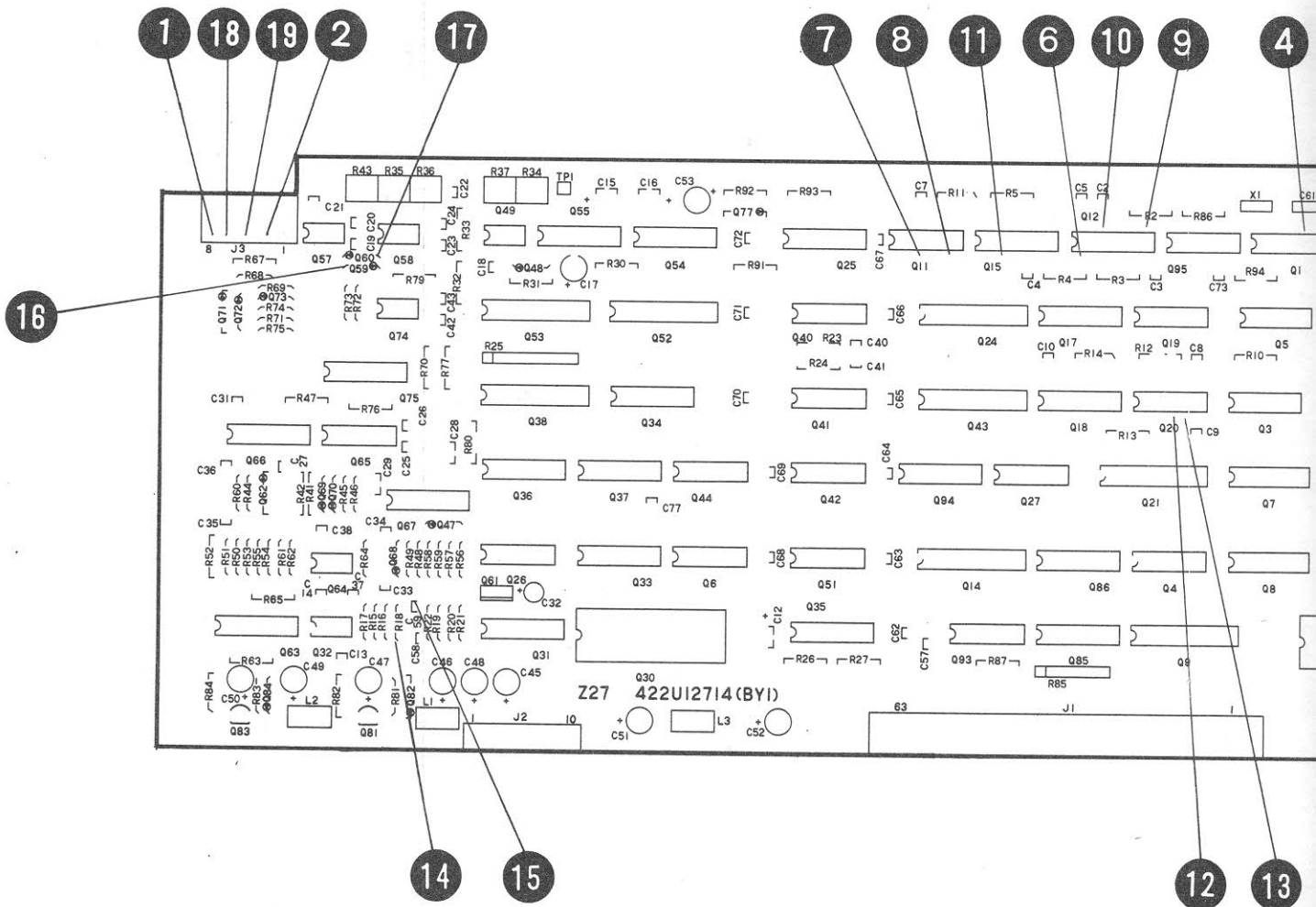
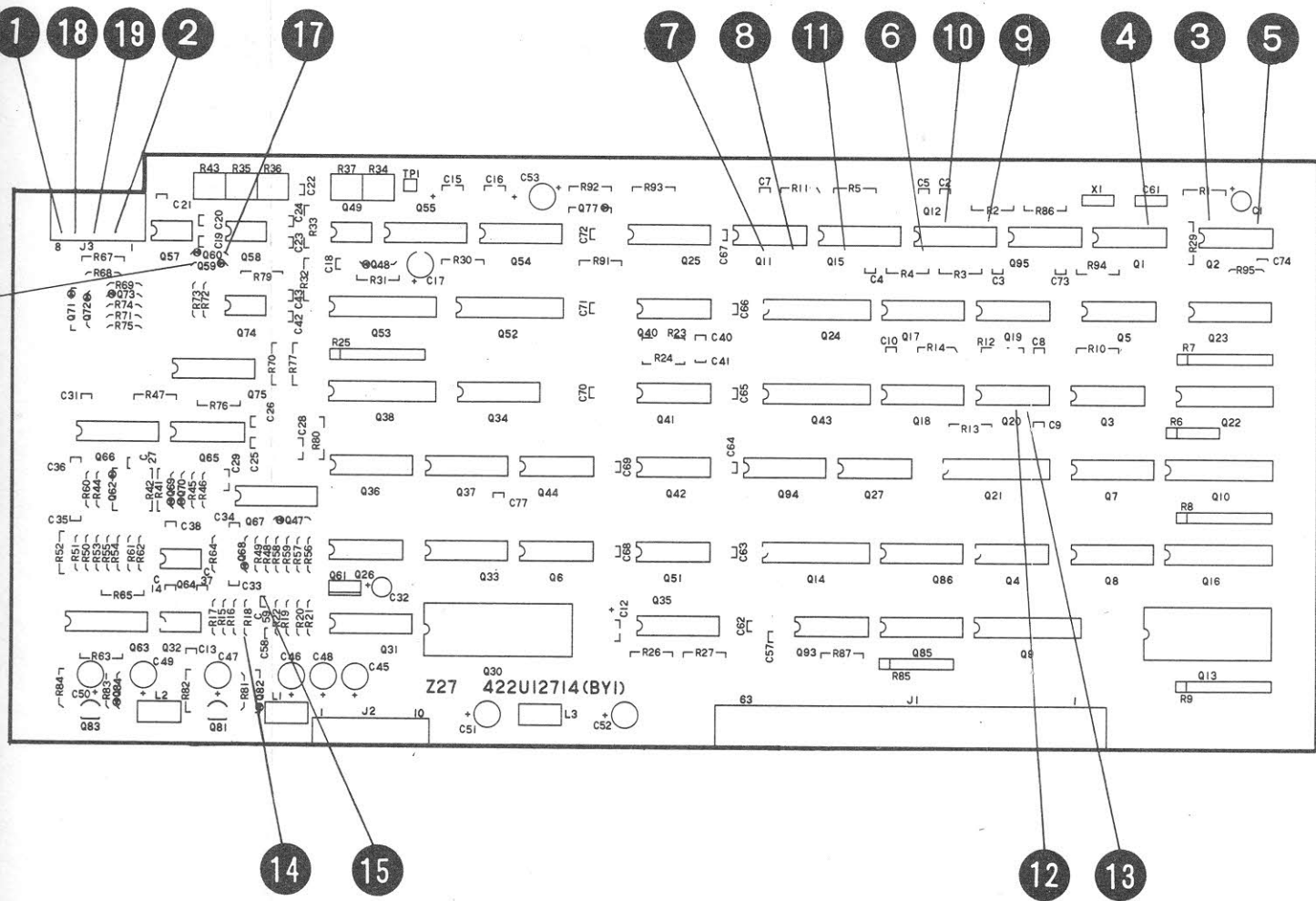


Fig. 5-74 Z27 Parts Layout



s Layout



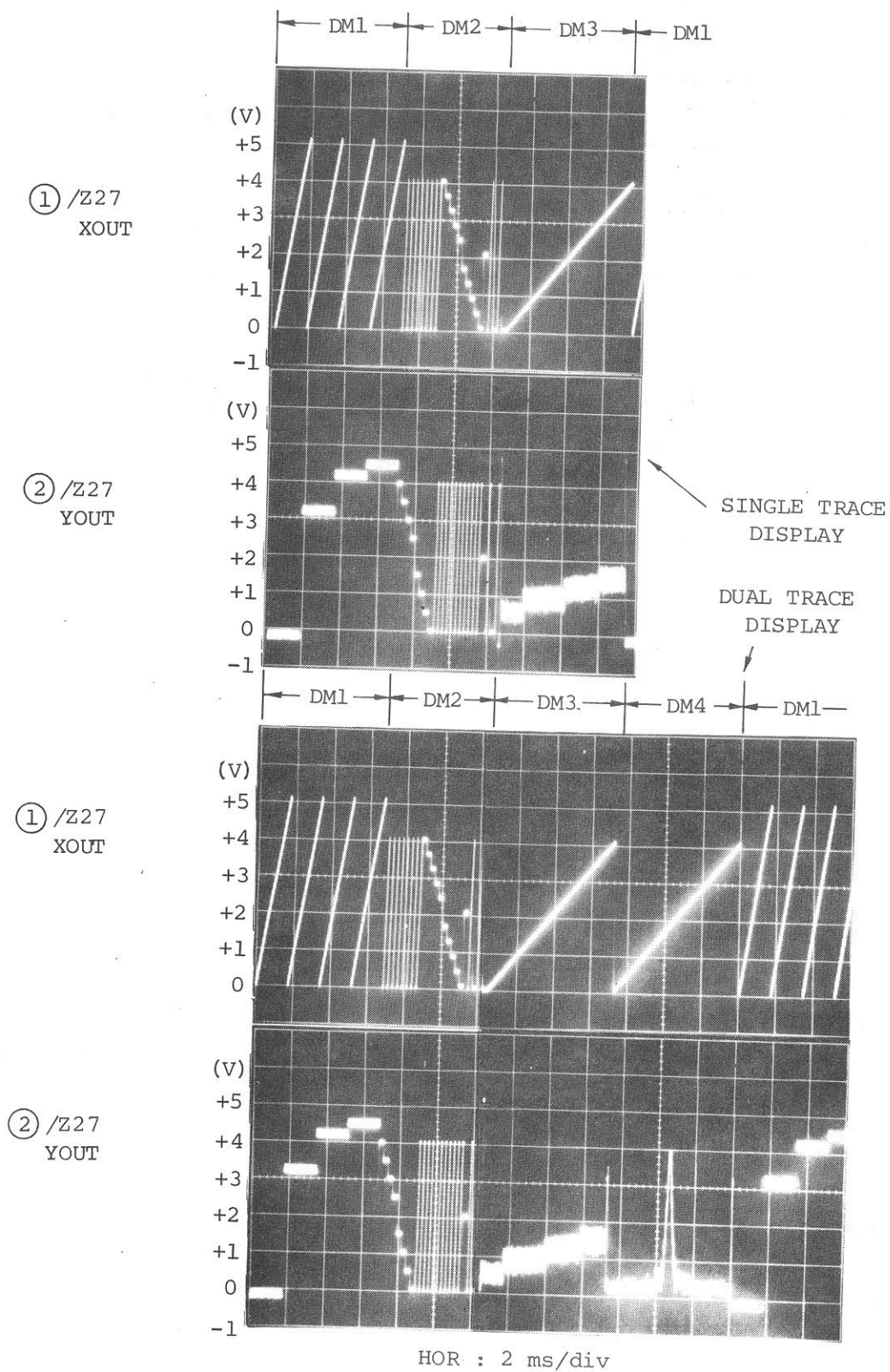


Fig. 5-75 Output of Z27 Display Control

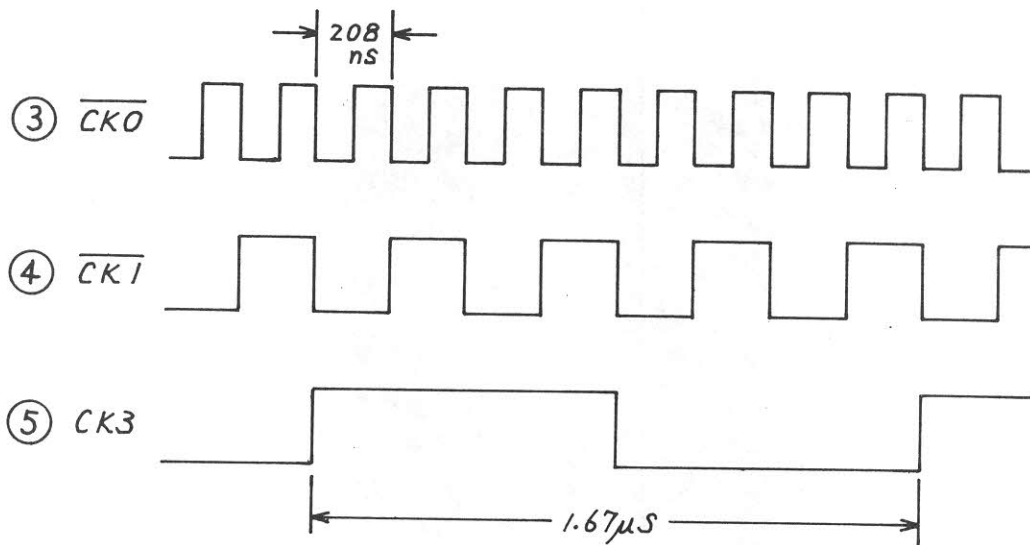


Fig. 5-76 Clock Signals for Display Control

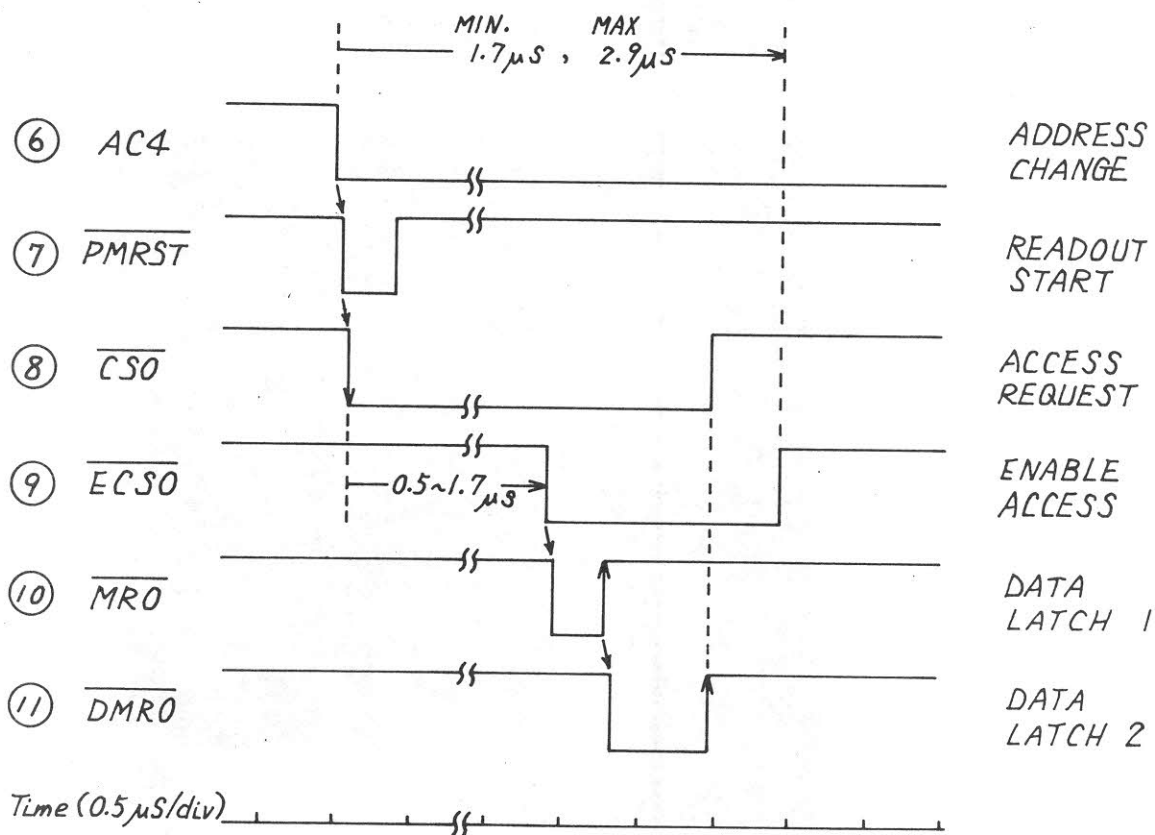


Fig. 5-77 Display RAM Access Timing Chart

⑫ /Z27  
DM1/2/6

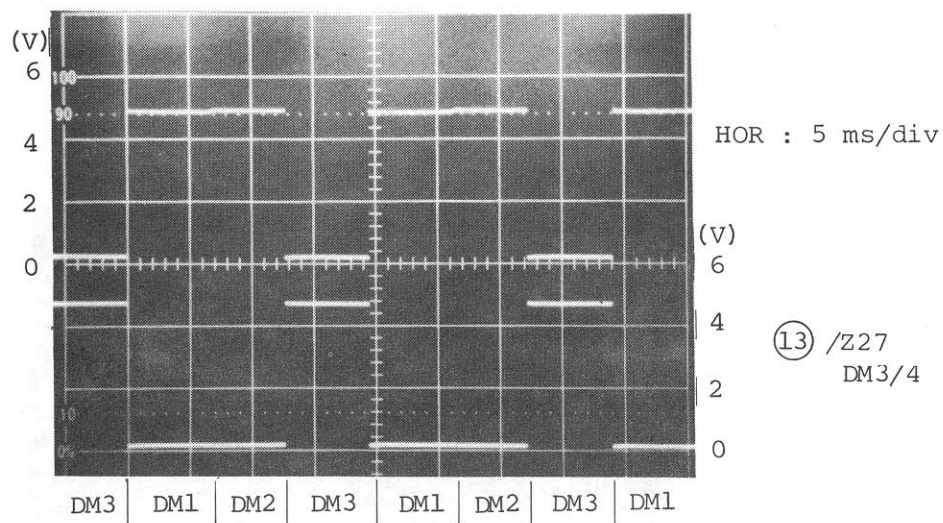


Fig. 5-78 Display Mode Status Signal

⑭ /Z27  
XC

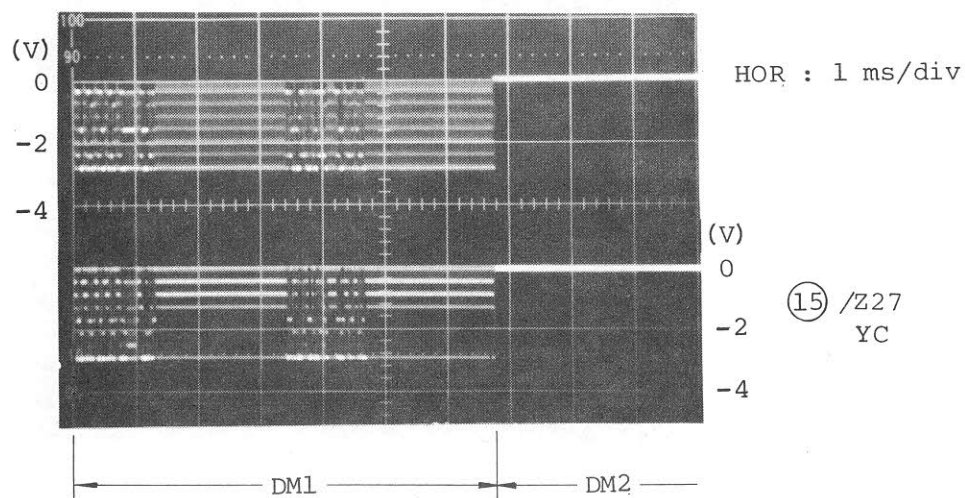


Fig. 5-79 Character Generator Output

⑯ /Z27  
XDA

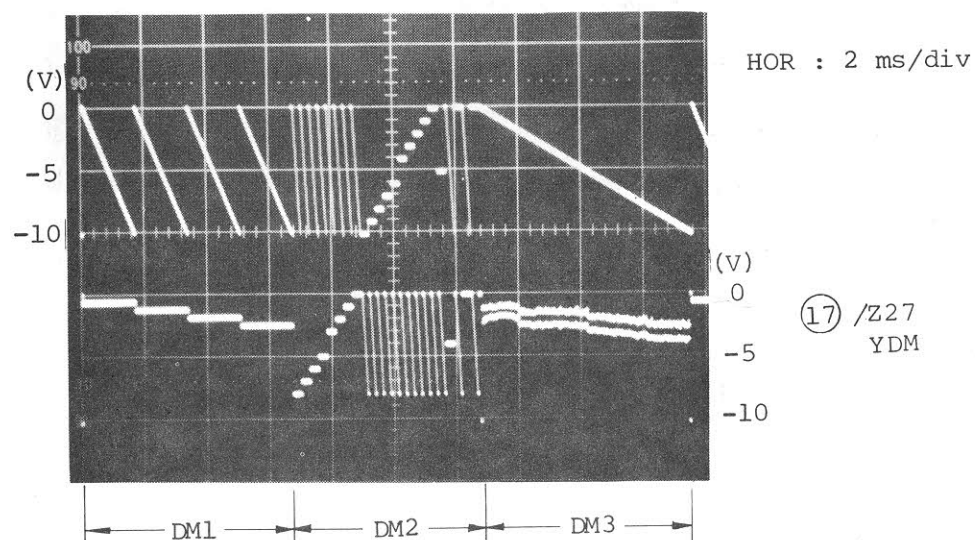


Fig. 5-80 X, Y D/A Output

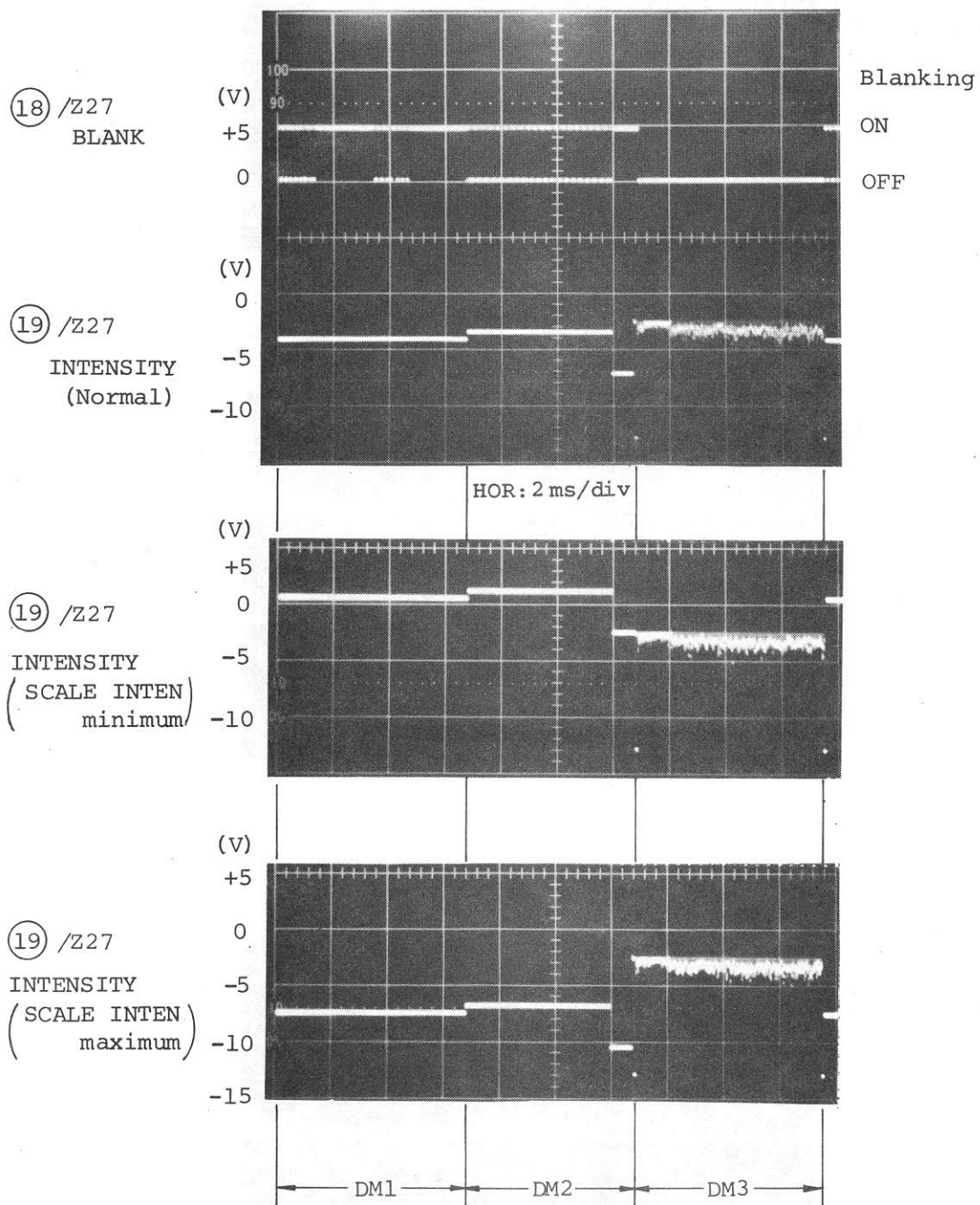
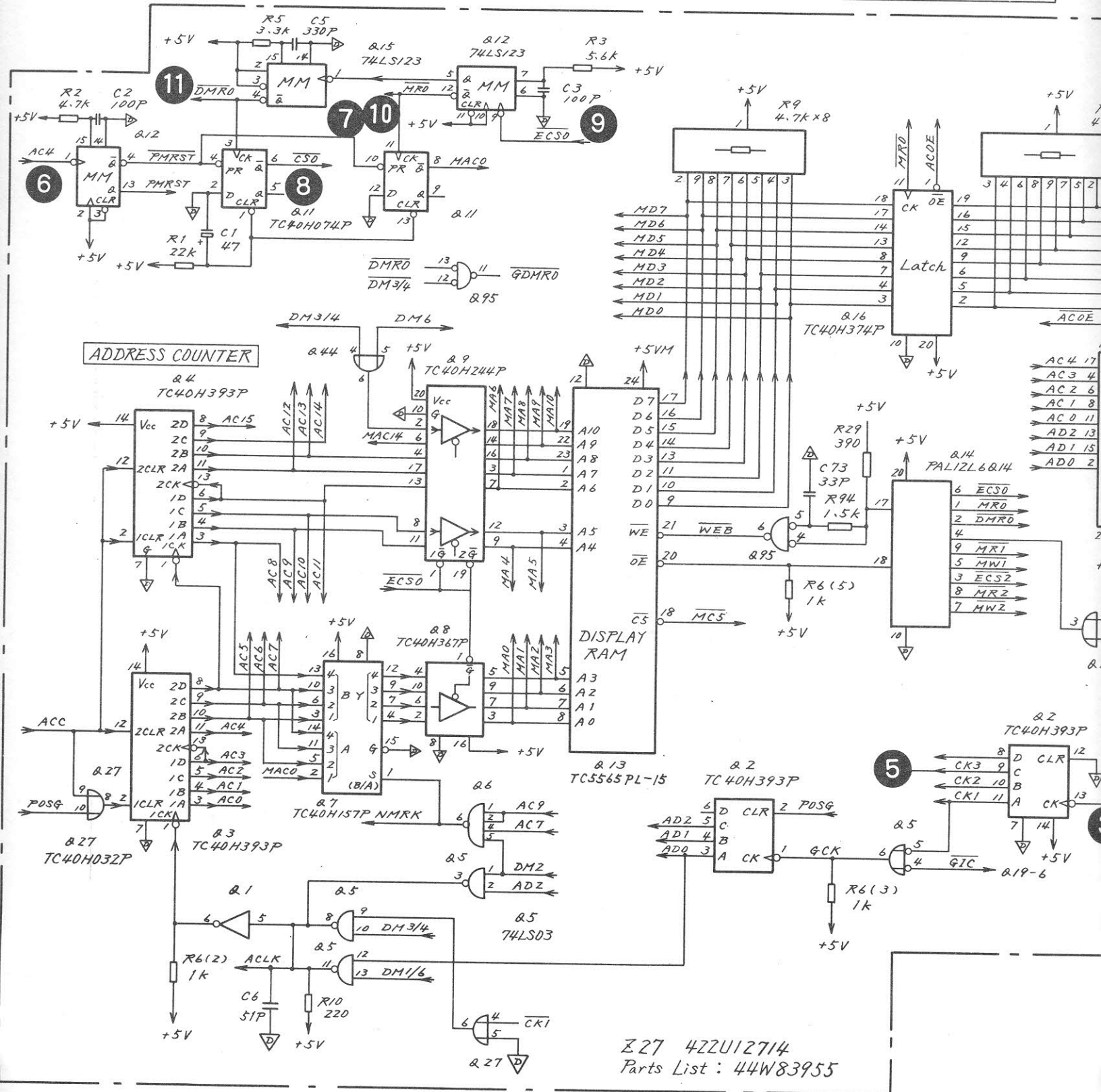


Fig. 5-81 BLANKING and INTENSITY Output

(A) DISPLAY RAM AND ACCESS CONTROL



(A) DISPLAY RAM AND ACCESS CONTROL

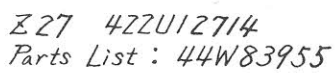
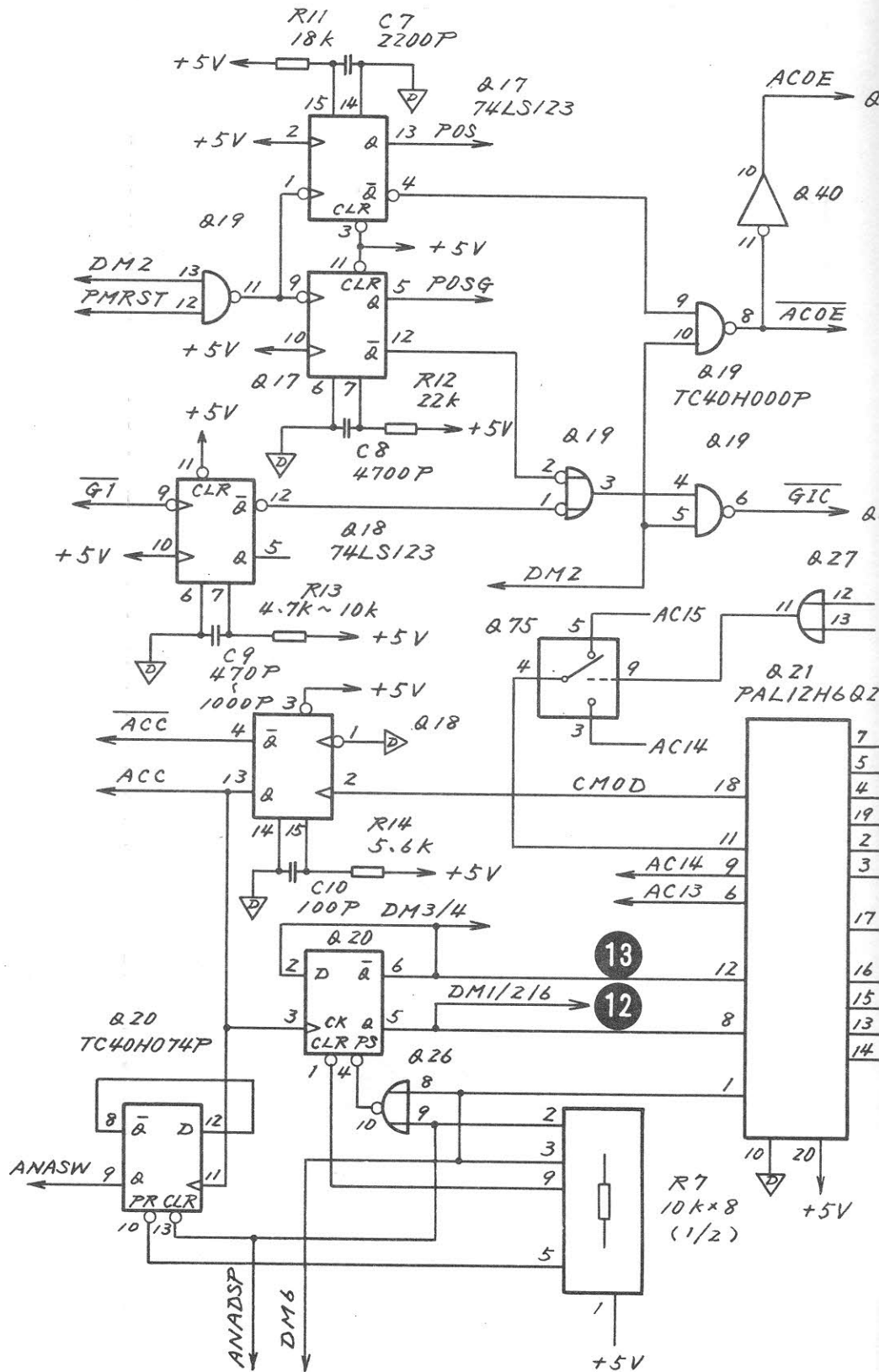


Fig. 5-82 (1/6)  
Z27 DISPLAY CONTROL  
Circuit Diagram (1/6)  
(43W 33958)

5-237/(5-238 blank)

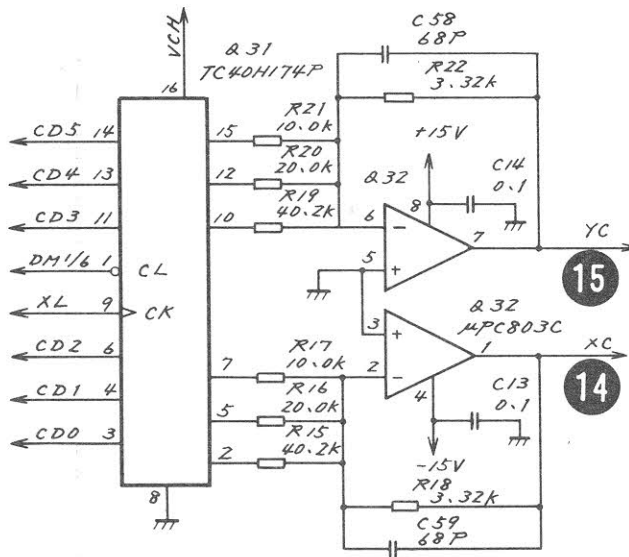




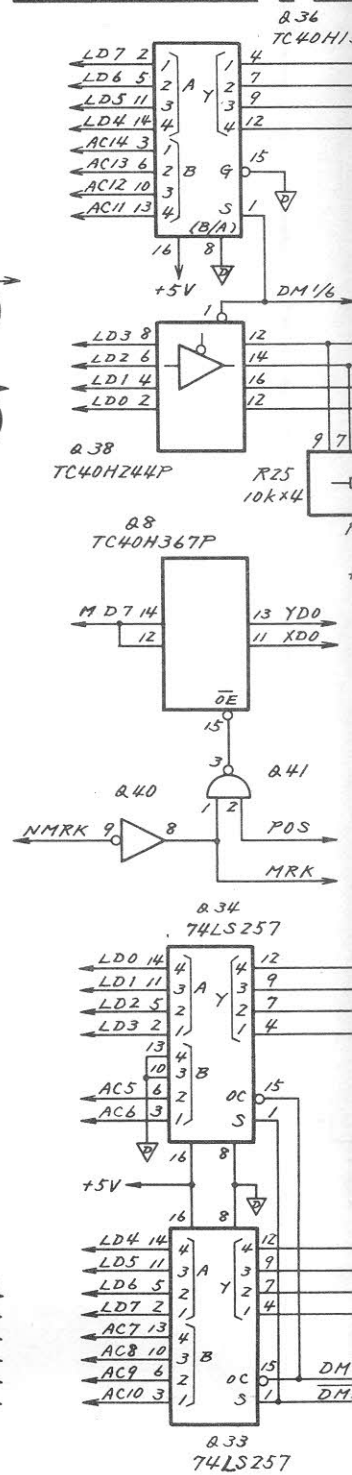
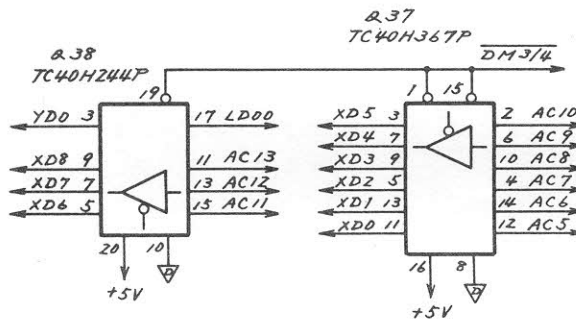
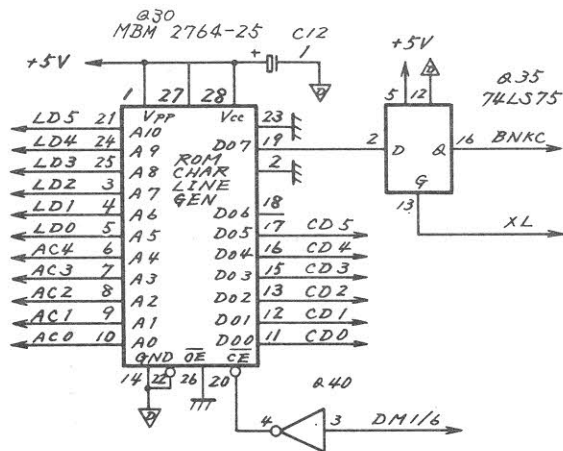




CHARACTER GENERATOR, DATA SELECTOR, AND D/A C



# CHARACTER GENERATOR



DATA SELECTOR

The diagram illustrates the Z27 Display Control (3/6) circuit, featuring several integrated circuits (ICs) and associated components. Key components include:

- ICs:** Q36 (TC40H157P), Q53 (TC40H374P), Q55 (AD7530JN), Q52 (TC40H374P), Q54 (MX7530JN), Q57 (μPC813C), Q59 (RD11EB), Q58 (μPC813C), Q49 (μPC258C), Q48 (15252), Q40 (74LS257), Q41 (74LS257), Q42 (74LS257), Q43 (74LS257), Q44 (74LS257), Q45 (74LS257), Q46 (74LS257), Q47 (74LS257), Q48 (15252), Q49 (μPC258C), Q50 (74LS257), Q51 (TC40H074P), Q52 (TC40H374P), Q53 (TC40H374P), Q54 (MX7530JN), Q55 (AD7530JN), Q56 (74LS257), Q57 (μPC813C), Q58 (μPC813C), Q59 (RD11EB).
- Resistors:** R25 (10k x 4), R26 (10k), R27 (10k), R32 (6.04k), R33 (3.65k), R34 (1k), R30 (715), R31 (301).
- Capacitors:** C22 (10P), C23 (0.1), C24 (0.1), C15 (1), C16 (1), C17 (47), C18 (0.1), C19 (0.1), C20 (0.1), C21 (10P).
- Signal Lines:** YD0, XD0, YD1, XD1, YD2, XD2, YD3, XD3, YD4, XD4, YD5, XD5, YD6, XD6, YD7, XD7, YD8, XD8, DM1/6, DM3/4, DM2, POS, MRK, TPI, +5V, -15V, +15V, VREF, RPB, I01, I02, GND, VREF, R30, R31, R32, R33, R34, C17, C18, C19, C20, C21, C22, C23, C24, Q40, Q41, Q42, Q43, Q44, Q45, Q46, Q47, Q48, Q49, Q50, Q51, Q52, Q53, Q54, Q55, Q56, Q57, Q58, Q59.

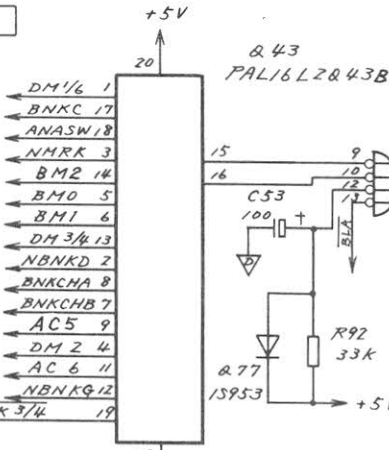
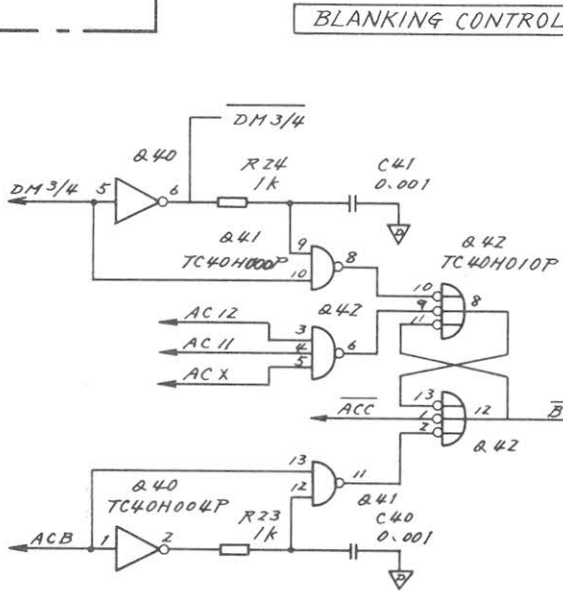
The circuit is divided into sections, with a central section labeled "D/A CONVERTERS". The diagram shows the interconnections between these components, including power supply lines and signal paths.

Fig. 5-82 (3/6)  
Z27 DISPLAY CONTROL  
Circuit Diagram (3/6)  
(43W 33958 M-1)

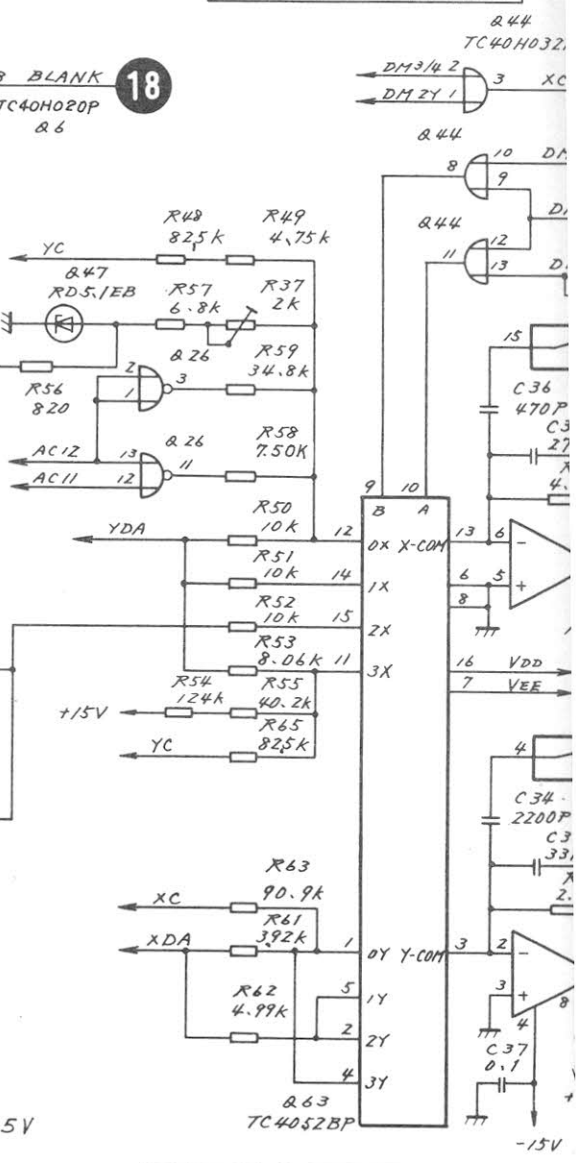
5-241/(5-242 blank)

# ① BLANKING CONTROL, LINE GENERATOR, SWITCH, AND ADDER

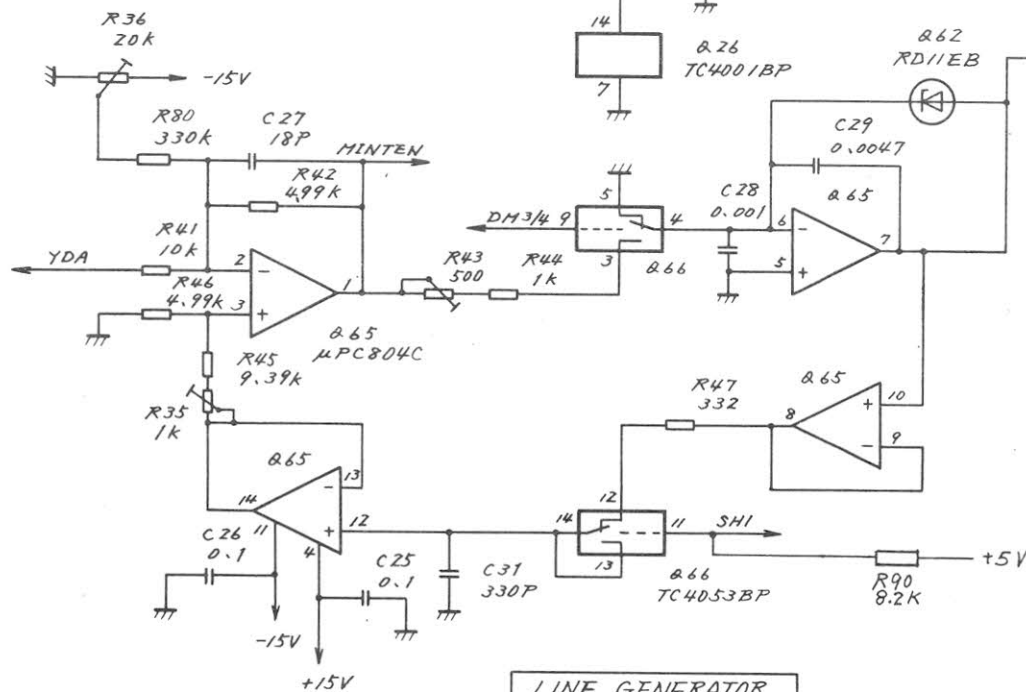
## BLANKING CONTROL



## SWITCH and ADDER



## LINE GENERATOR



# LINE GENERATOR, SWITCH, AND ADDER

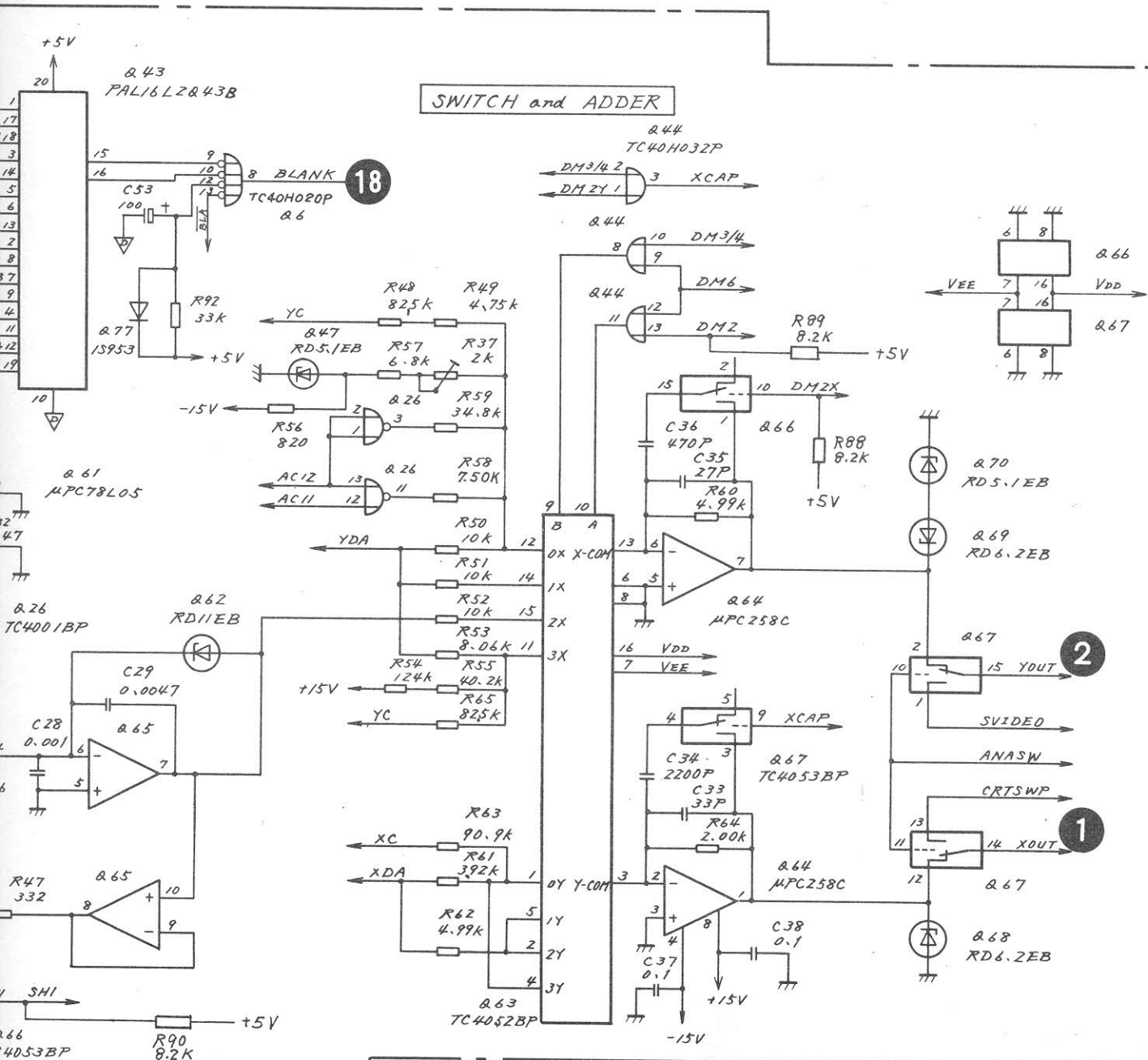
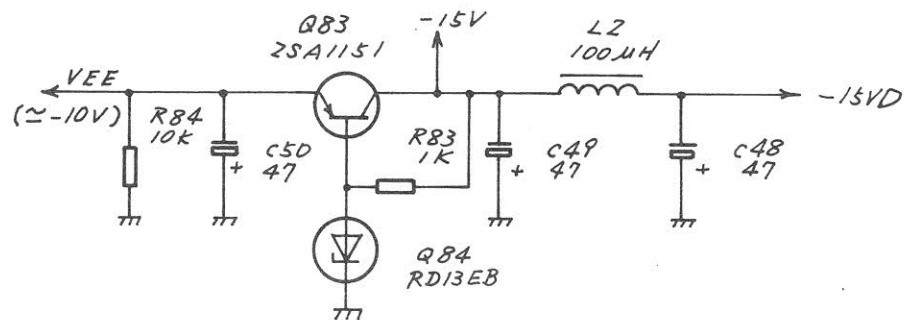
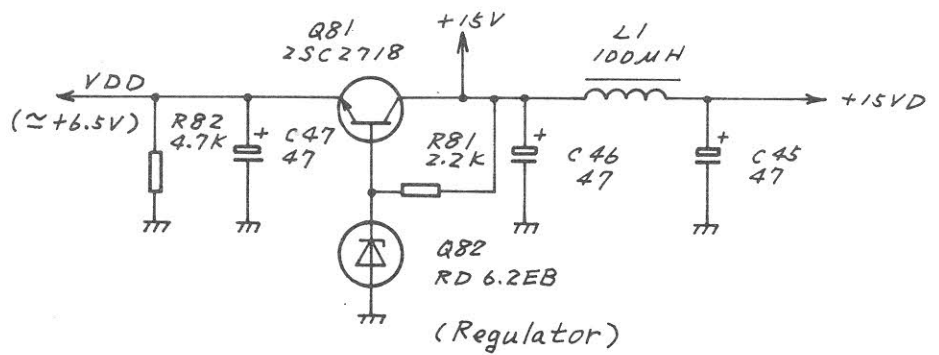
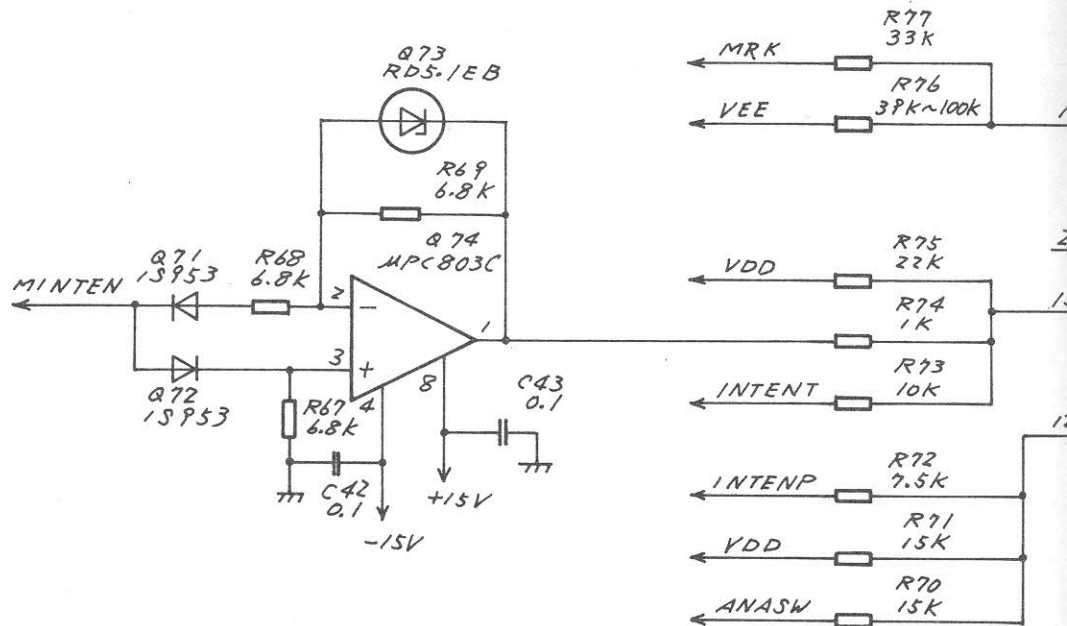


Fig. 5-82 (4/6)  
Z27 DISPLAY CONTROL  
Circuit Diagram (4/6)  
(43W 33958)

5-243/(5-244 blank)

(E) INTENSITY CONTROL



(E) INTENSITY CONTROL

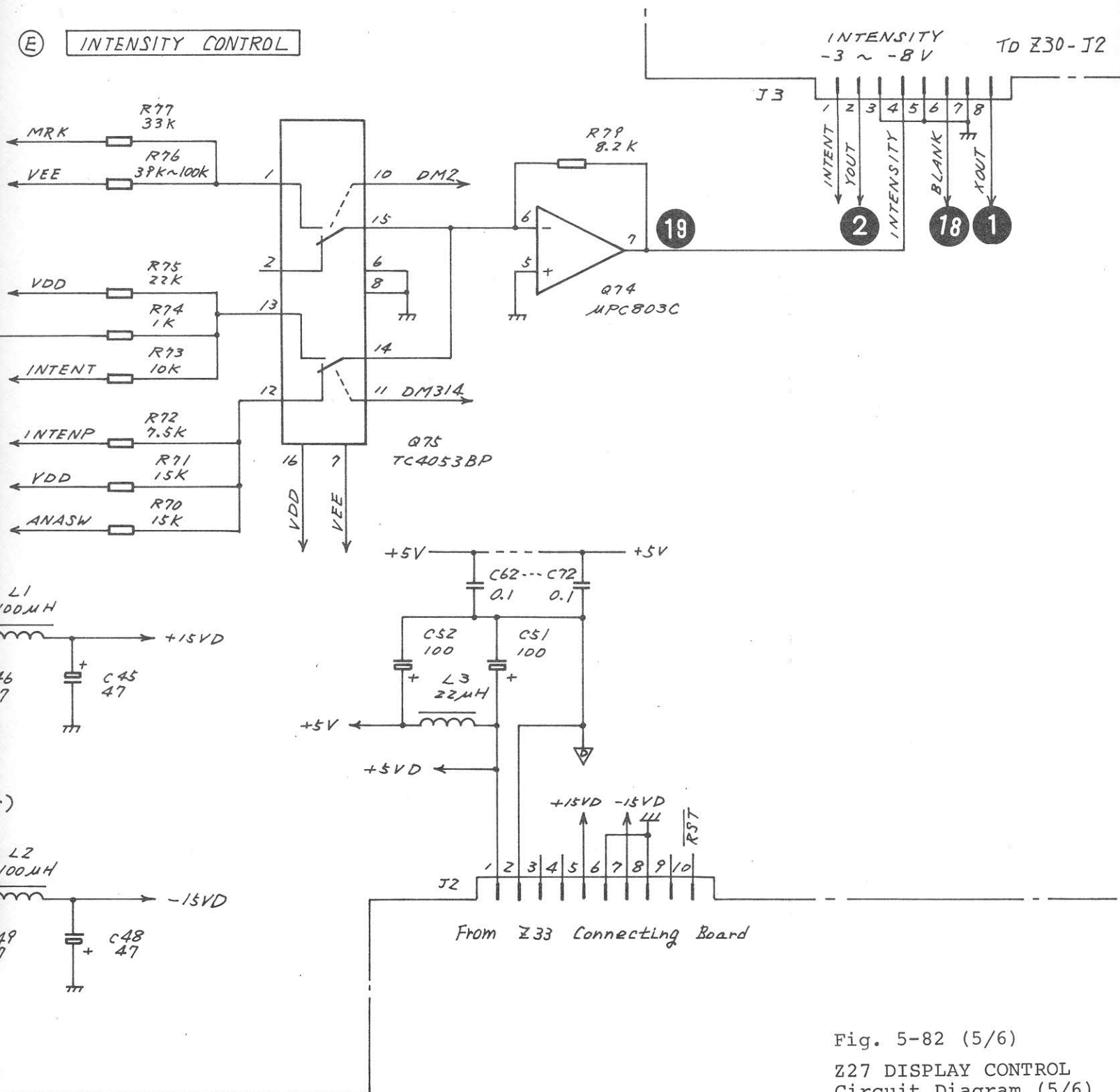
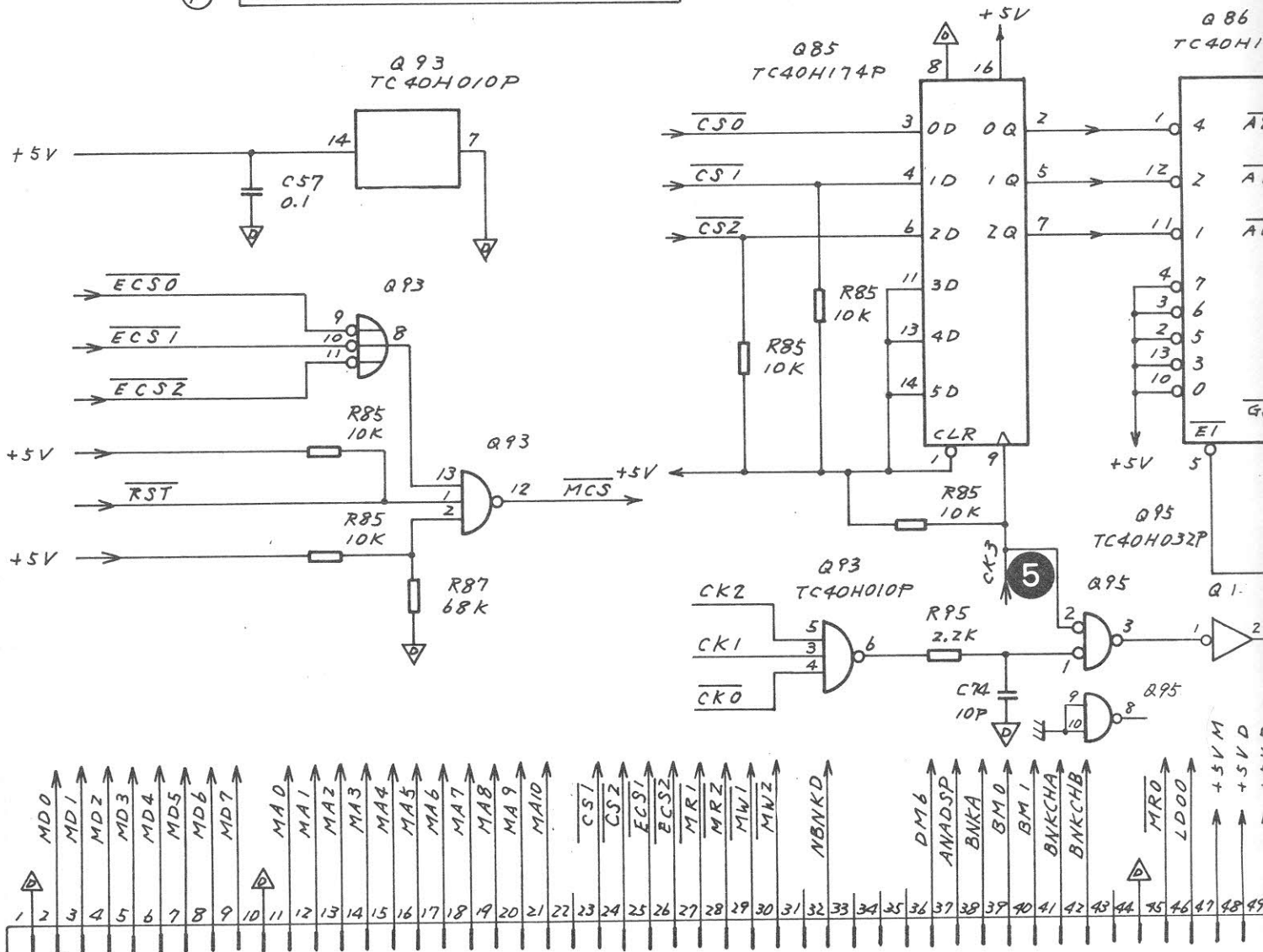


Fig. 5-82 (5/6)  
Z27 DISPLAY CONTROL  
Circuit Diagram (5/6)  
(43W 33958)

5-245/(5-246 blank)

(F) MEMORY ACCESS PRIORITY CONTROL



To and From  
Z26-J1, Z34-J1 via J52

PRIORITY CONTROL

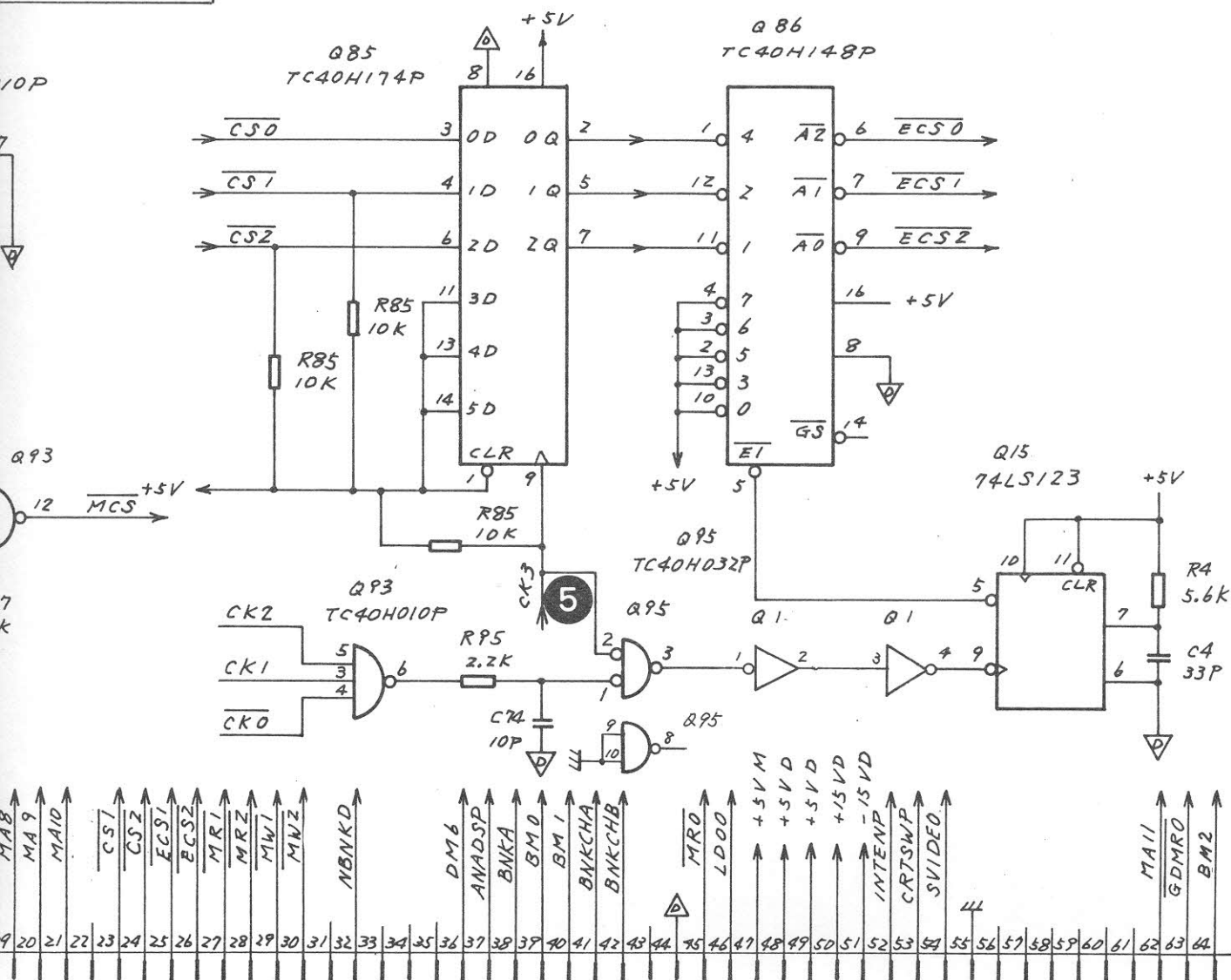


Fig. 5-82 (6/6)

Z27 DISPLAY CONTROL  
Circuit Diagram (6/6)  
(43W 33958)

5-247/(5-248 blank)



## 5.15 Z28 LOW LOCAL 1 (MS710C only)

### 5.15.1 Circuit description - Z28

(Refer to Fig. 5-84)

This circuit generates the first local signal for the 10 kHz to 30 MHz band.

This local signal is generated by the voltage controlled oscillator consisting of Q1 to Q5. The frequency range is 1042.8 to 1102.8 MHz.

Part of the oscillator output signal is amplified by amplifier Q6 and sent to the Z29 low local 2 to be used in the PLL circuit for stabilizing the frequency.

Another part of the signal is amplified by Q10 and frequency-divided in half by divider Q12.

The output from divider Q12-6 is amplified by Q13, and sent to J3 of the Z24 local control 2 as an AFC loop signal to improve linearity of the VCO frequency.

The output from divider Q12-7 is amplified by Q18, and sent to J3 of the Z35 low 1st MIX as a first mixer local signal for the 10 kHz to 30 MHz band.

### 5.15.2 Checking procedure - Z28

Step	Procedure
1	Set the MS710[ ] as follows: Frequency band : 10 kHz to 30 MHz Center frequency : 15 MHz Span : 0 Hz/div

(cont.)

Step	Procedure
2	Measure the frequency and level at connector Z28-J94 ⑬ . This circuit is normal when the measured values are:  Frequency : 536.4 MHz Level : approx. +9 dBm
3	Measure and compare the J3-5 voltage and the frequency at connector Z28-J94 ⑬ with the values shown in Fig. 5-40.

#### 5.15.3 Adjustment - Z28

This circuit requires no adjustment. The Q1 VCO frequency is adjusted in the procedure for the Z24 local control 2.

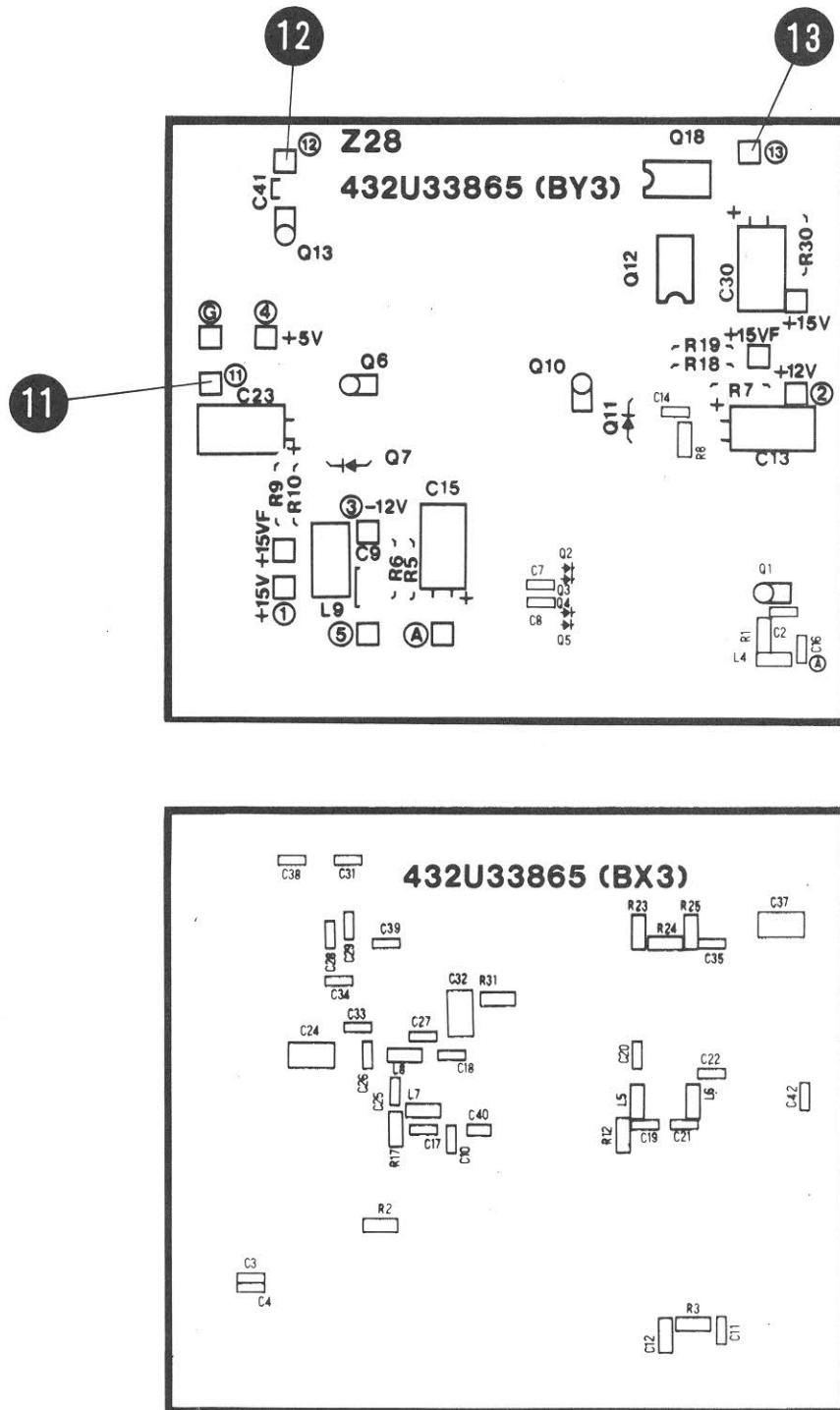
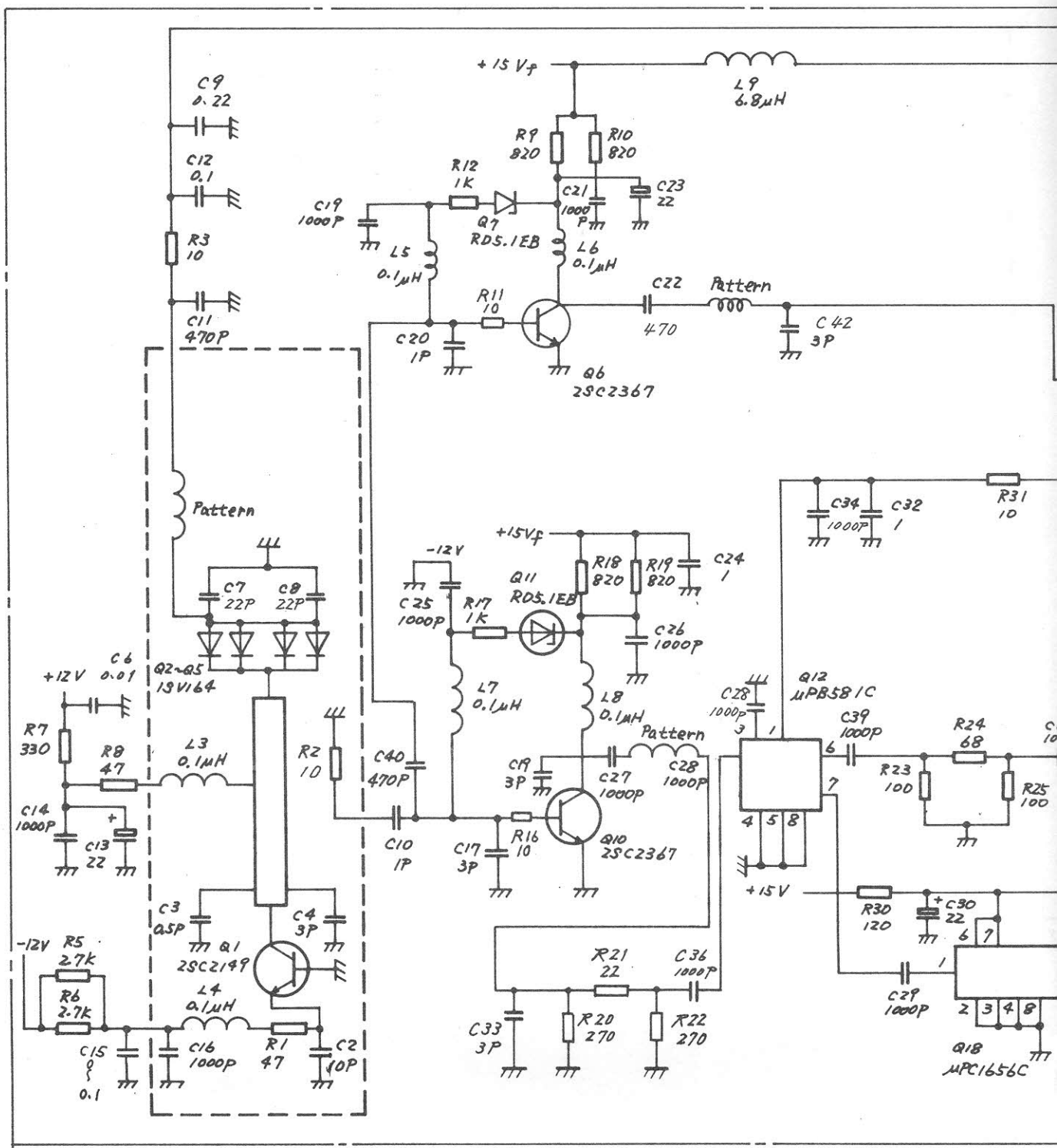
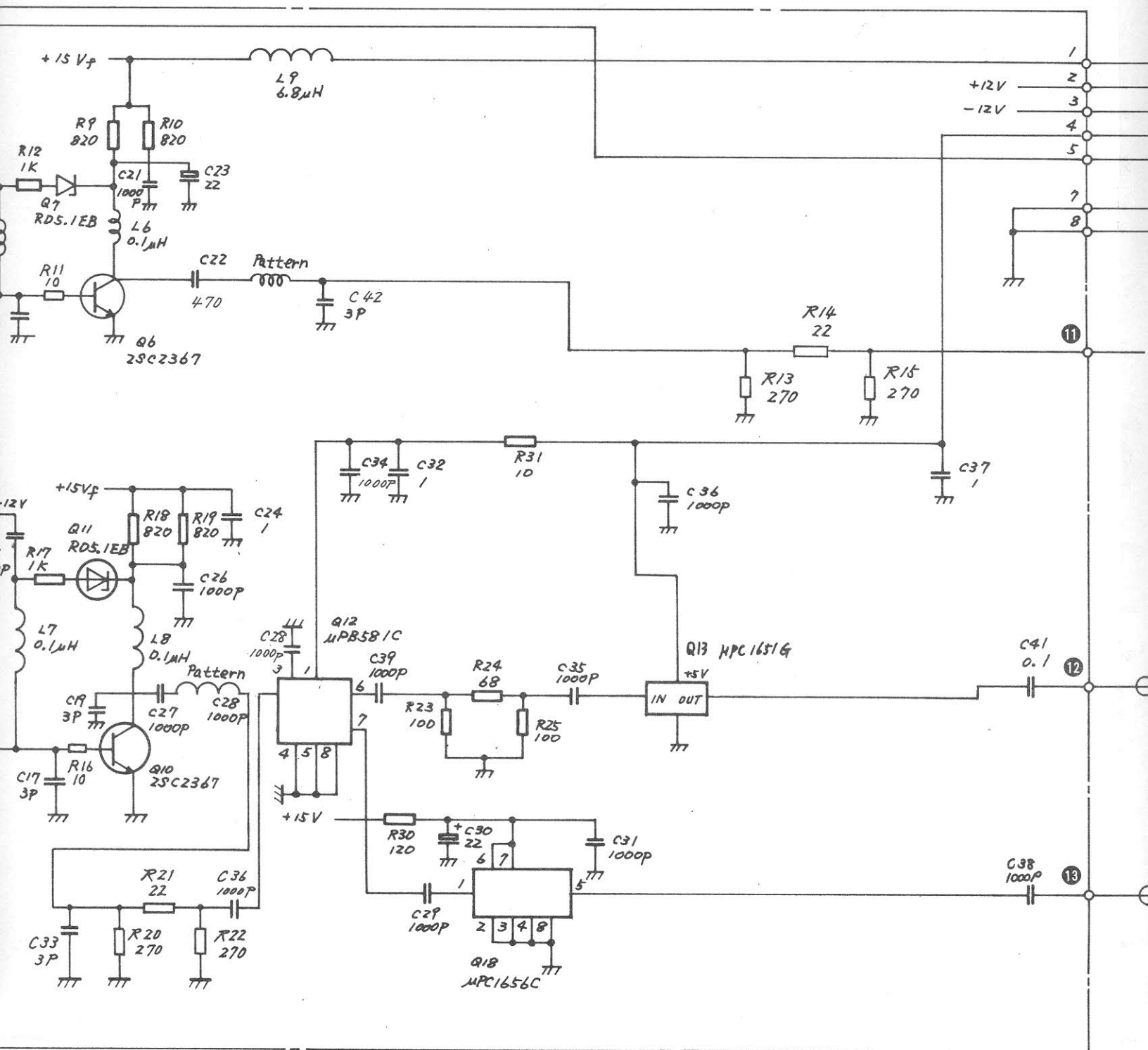


Fig. 5-83 Z28 Parts Layout



Parts List : 44W

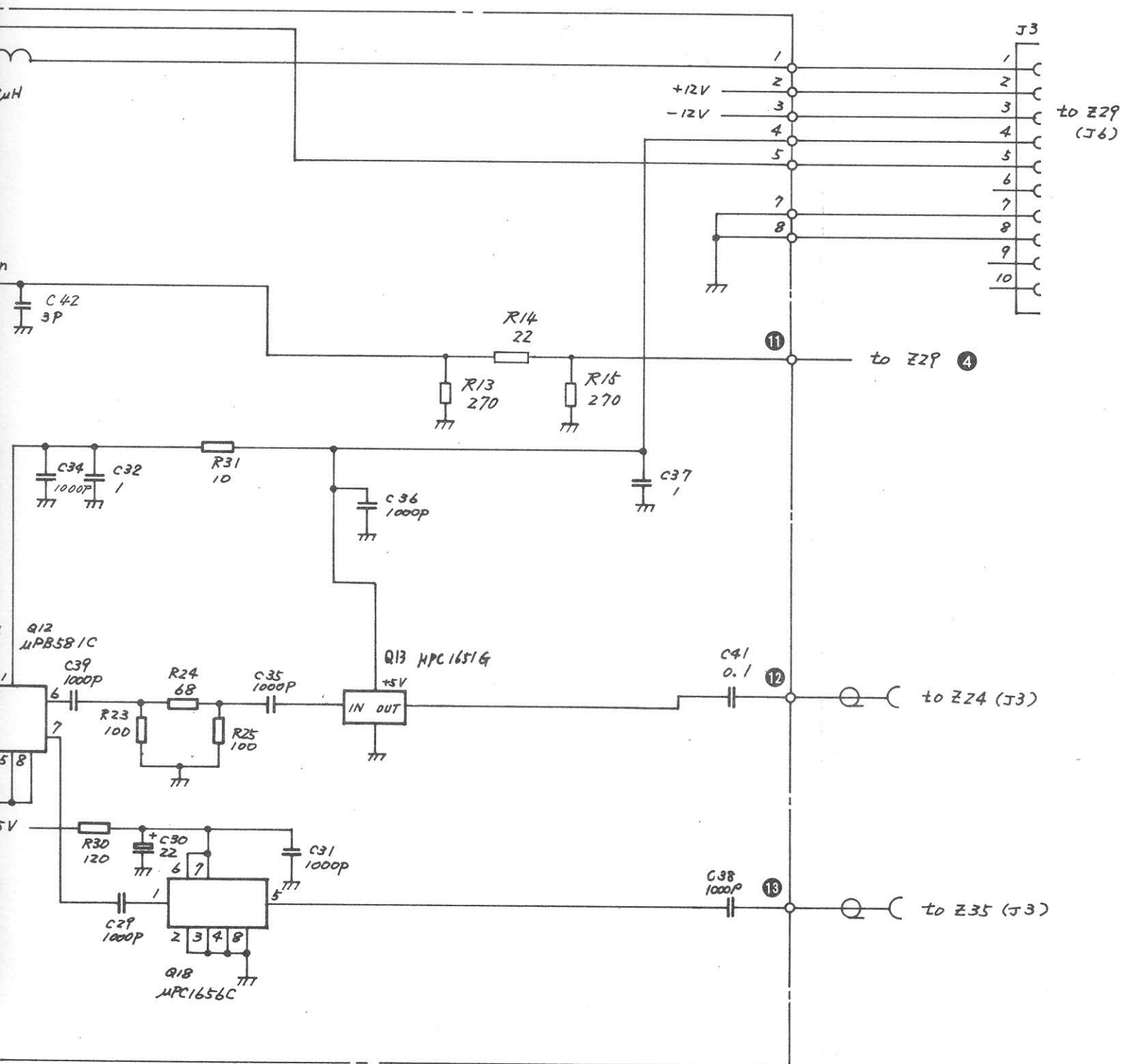
PC Board : 432L



Parts List : 44W83956

PC Board : 432U33865

Fig. 5-  
Circuit



Parts List : 44W83956  
PC Board : 432U33865

Fig. 5-84 Z28 LOW LOCAL 1  
Circuit Diagram (43W33959)

5-253/(5-254 blank)

## 5.16 Z29 LOW LOCAL 2 (MS710C only)

### 5.16.1 Circuit description - Z29

This circuit is part of the PLL which stabilizes the frequency of the first local signal for the 10 kHz to 30 MHz band.

The local signal ④ is amplified by amplifier Q2 and mixed with the 2 MHz step M/N synthesizer output from the Z16 PLL block by the Z29-Z1 double-balance mixer to be converted to an 8.7  $\pm$ 1 MHz signal.

This 8.7 MHz signal is amplified by Q17 and sent to J13 of the Z16 PLL block through relay K1. Relay K1 is switched according to the frequency band setting.

This circuit supplies dc power to the Z28 low local-1 through the following stabilizing power circuits.

Output voltage	Input voltage	Circuit
+12 V	+15 V	Q7 to Q9
+5 V	+15 V	Q18 to Q21
-12 V	-15 V	Q8, Q12 to Q14

### 5.16.2 Checking procedure - Z29

Step	Procedure
1	Set the MS710C as follows: Frequency band : 10 kHz to 30 MHz Center frequency : 15 MHz Span : 0 Hz
2	Disconnect connector Z29-J93 ③ .
3	Connect the frequency counter to Z28-J94 ⑬ to measure low local frequency $f_{LO}$ .
4	Connect the signal generator to connector Z29-J91 ① and apply the following signal: Frequency : $f_{LO} + 8.7$ MHz Level : +10 dBm
5	Connect Network/Spectrum Analyzer MS420B to connector J29-J92 ② and measure the frequency and level. Z29 is normal when the measured values are: Frequency : 8.7 MHz Level : approx. -10 dBm.

### 5.16.3 Adjustment - Z29

This circuit requires no adjustment.



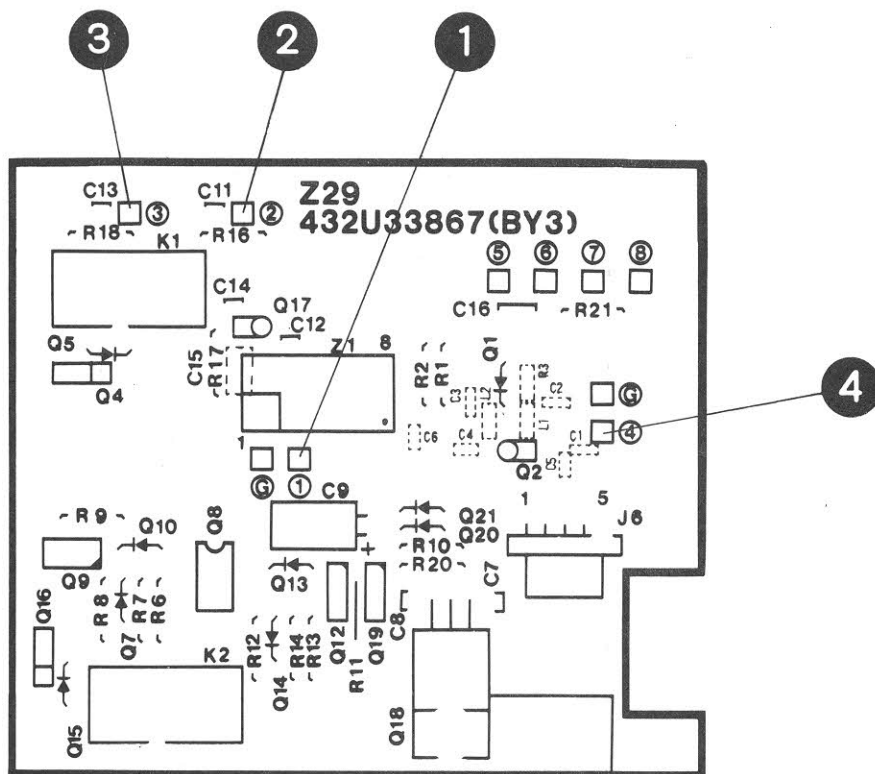
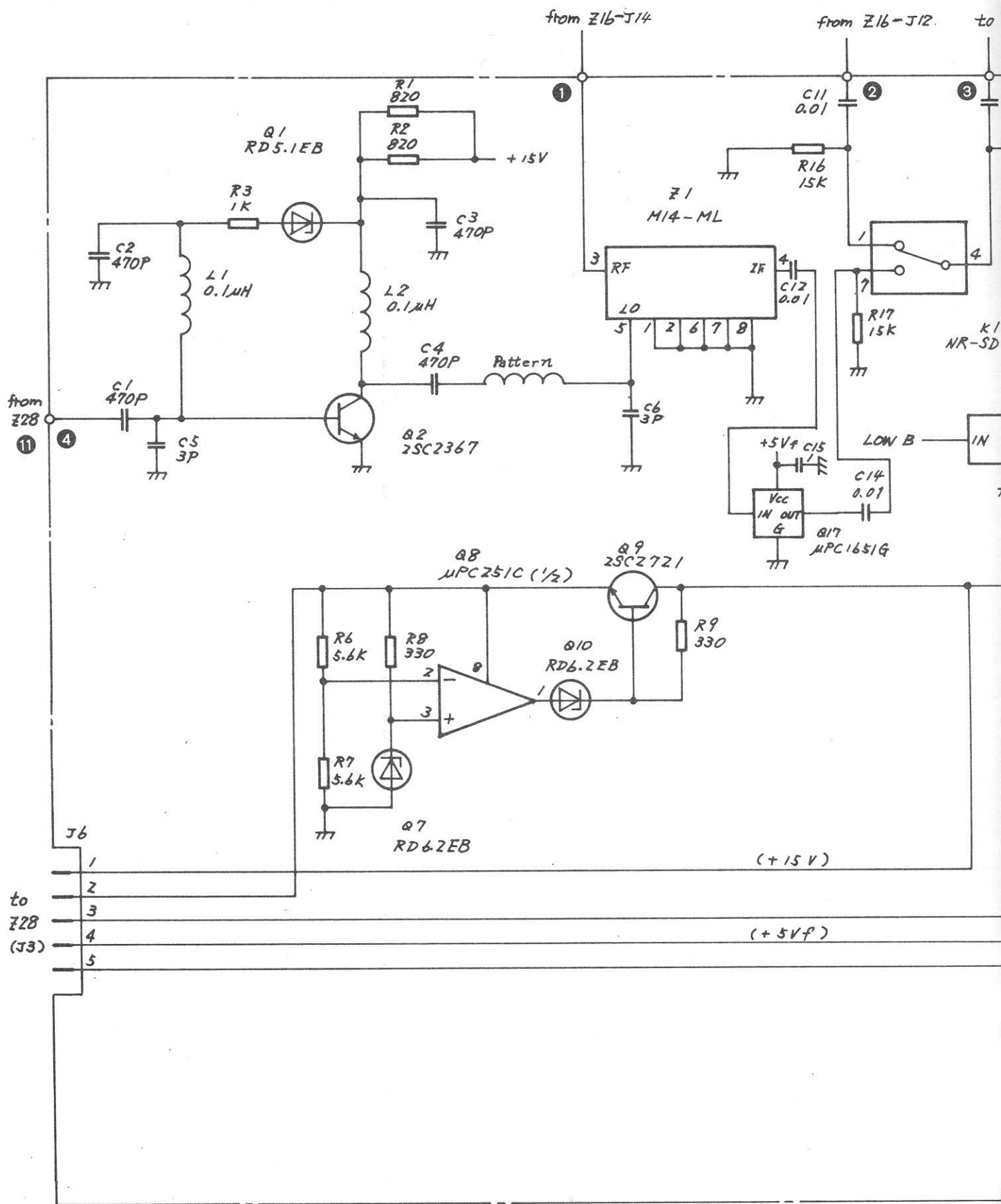


Fig. 5-85 Z29 Parts Layout



Parts List ; 44W

PC Board ; 432

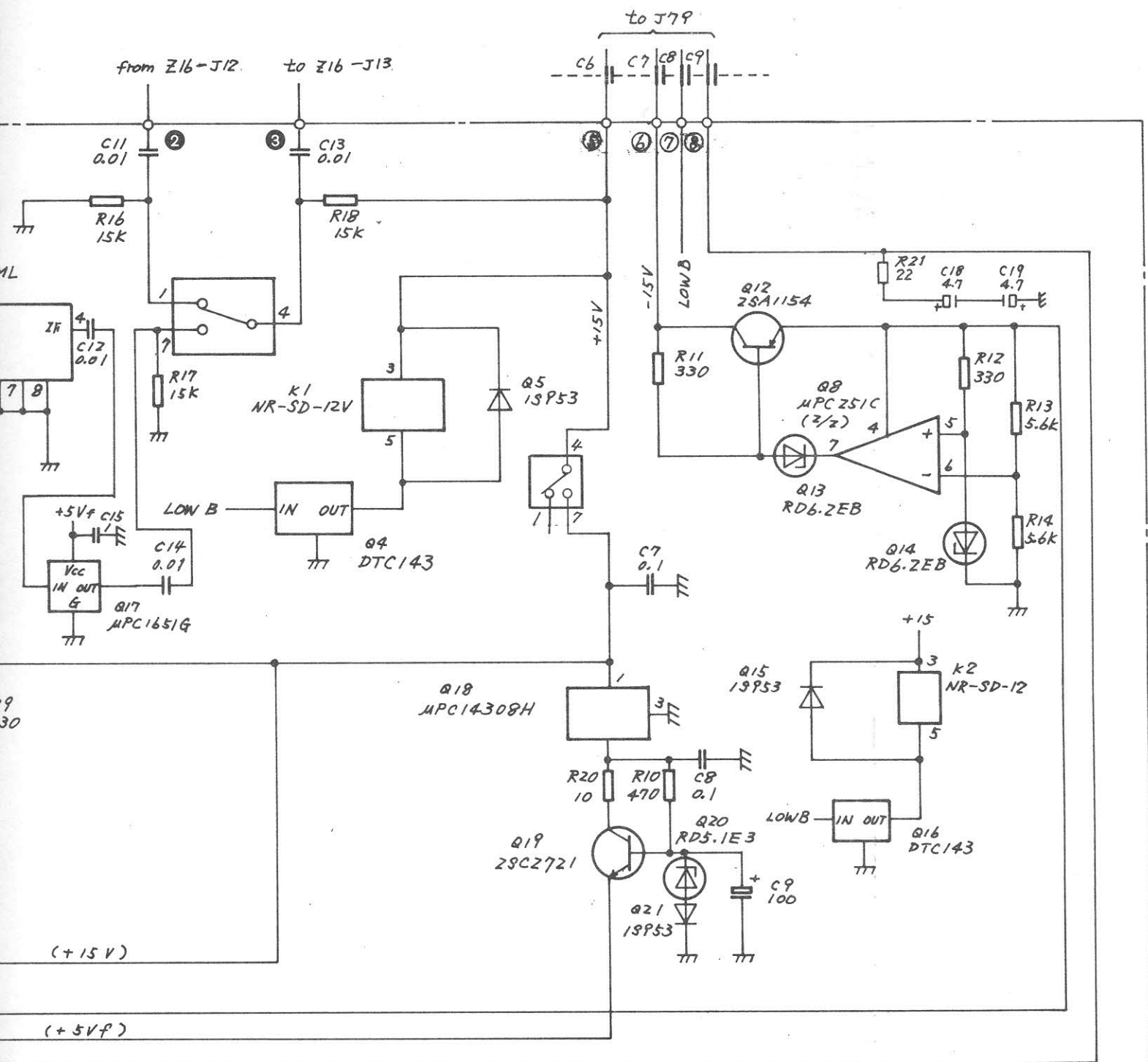


Fig. 5-86 Z29 LOW LOCAL 2  
Circuit Diagram (43W33960)

Parts List ; 44W83957  
PC Board ; 432U33867

5-259/(5-260 blank)

## 5.17 Z30 CRT BIAS/X-Y AMP

### 5.17.1 Circuit description - Z30

(Refer to Fig. 3-3 (3/4) and Fig. 5-92)

This PC board contains the circuitry used to generate the high-voltage bias signals required to drive the CRT, and the deflection voltage signals in both horizontal (X) and vertical (Y) directions.

This circuitry, including the primary-side winding of T1, Q28, Q29, C11, and C12, is the oscillation circuit of approximately 25 kHz. The high-voltage 25 kHz signals are generated in the secondary-side winding of T1 according to the individual winding ratios, and by rectifying them various high dc voltages required for CRT operation are obtained.

CRT brightness is adjusted by varying the voltage applied to G1 (J5-4). The circuitry that includes Q35 to Q45 generates these signals. The blanking and intensity control signals sent from the Z27 display control circuit are applied to this brightness control circuit through the Q25 photocoupler.

The X-Y amplifier generates X- and Y-axial direction deflection signals and is a differential amplifier circuit that outputs symmetrical output signals to X+, X- and Y+, Y- deflection plates. The input signal sensitivity is approximately 2 cm/V on the CRT screen.

### 5.17.2 Checking Procedure - Z30

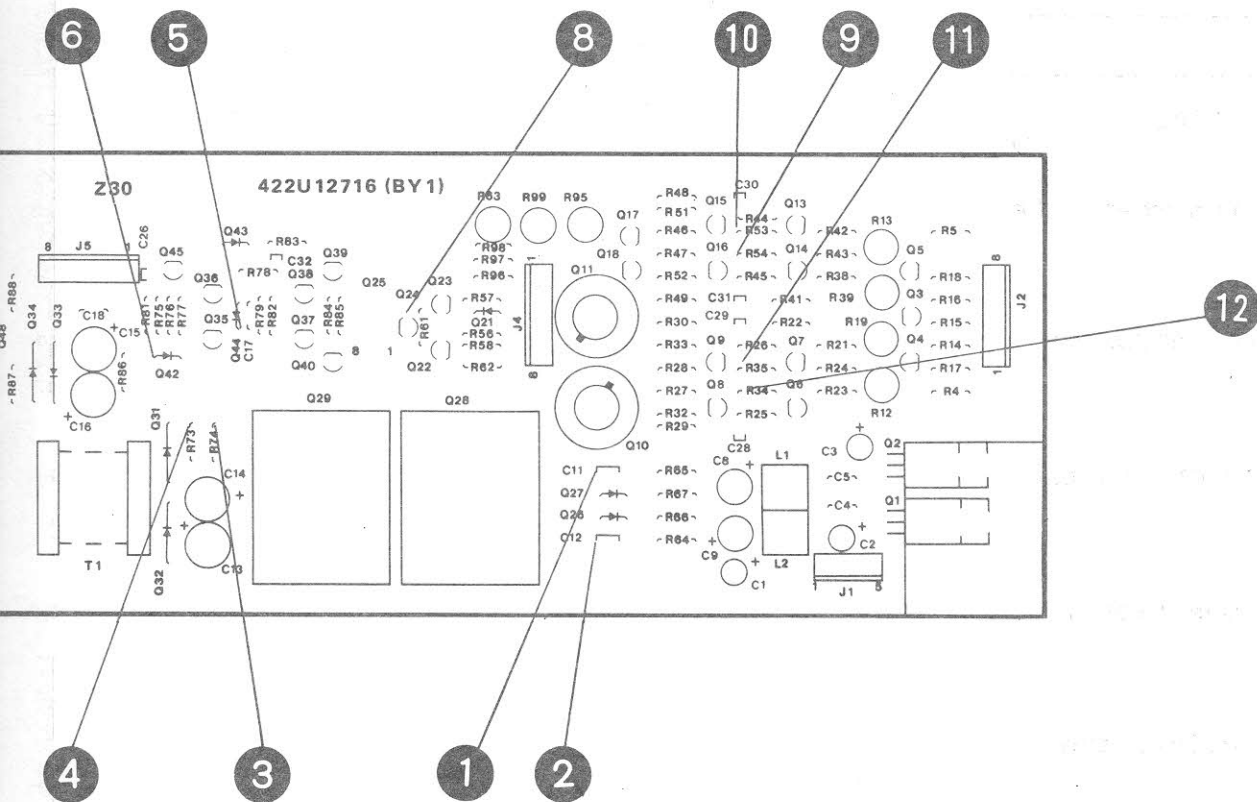
This PC board generates a high voltage signal (maximum of 5.5 kV) for the CRT bias, so be careful during servicing.

Step	Procedure
1.	Remove the left side panel as shown in Fig. 2-6.
2.	Turn the power supply switch OFF and remove the plastic protective board ⑥.
3.	Turn the power supply switch ON.
4.	To confirm the primary oscillation circuit operation of the high voltage generation circuit, observe the waveforms at checkpoints ① and ② using an oscilloscope. Check whether they are the same as shown in Fig. 5-88.
5.	Using a high-voltage probe, measure the secondary voltages of the high voltage generation circuit at checkpoints ③ to ⑦. Confirm that the values are as shown on the Z30 circuit diagram of Fig. 5-92.
6.	Observe the control signal ⑧ of the blanking circuit, and confirm that the amplitude is approximately 3 Vp-p as shown in Fig. 5-89.
7.	Confirm that the drive signals of the two X-Y deflection plates at checkpoints ⑨ to ⑫ are as shown in Fig. 5-90 and 5-91. If the drive signals are abnormal, check the Y and X amplifier inputs of J2-2 and J2-8, and check whether a correct signal is input from the Z27 display control. A normal input waveform with the power ON and in the reset state is shown in Fig. 5-75 (XOUT and YOUT waveforms of Z27).

### 5.17.3 Adjustment - Z30

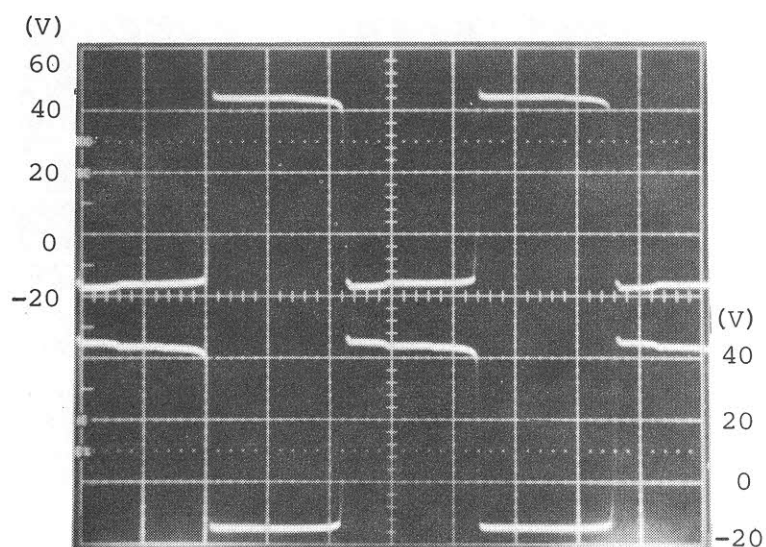
Step	Procedure
1.	Focus the picture with R95, R99, and FOCUS R101.
2.	Set R63 by turning it an additional 1 mm from where the blanking part of the trace disappears.
3.	Adjust the brightness of the trace by SCALE INTENSITY (on the front panel).
4.	Adjust the horizontal line with TRACE ROTATION (on the rear panel).
5.	Set the trace position with R12 (vertical position), and R13 (horizontal position).
6.	Set the trace position with R19 (vertical gain), and R39 (horizontal gain).







① /Z30

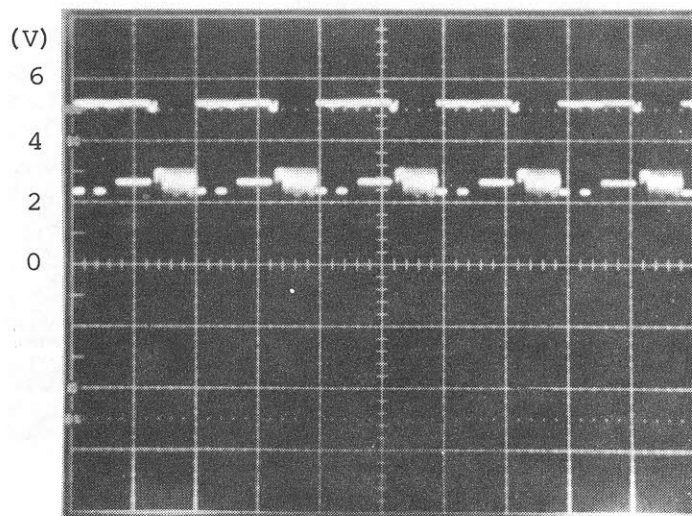


② /Z30

HOR : 10  $\mu$ s/div

Fig. 5-88 25 kHz OSC

⑧ /Z30



HOR : 10 ms/div

Fig. 5-89 BLANKING CONTROL

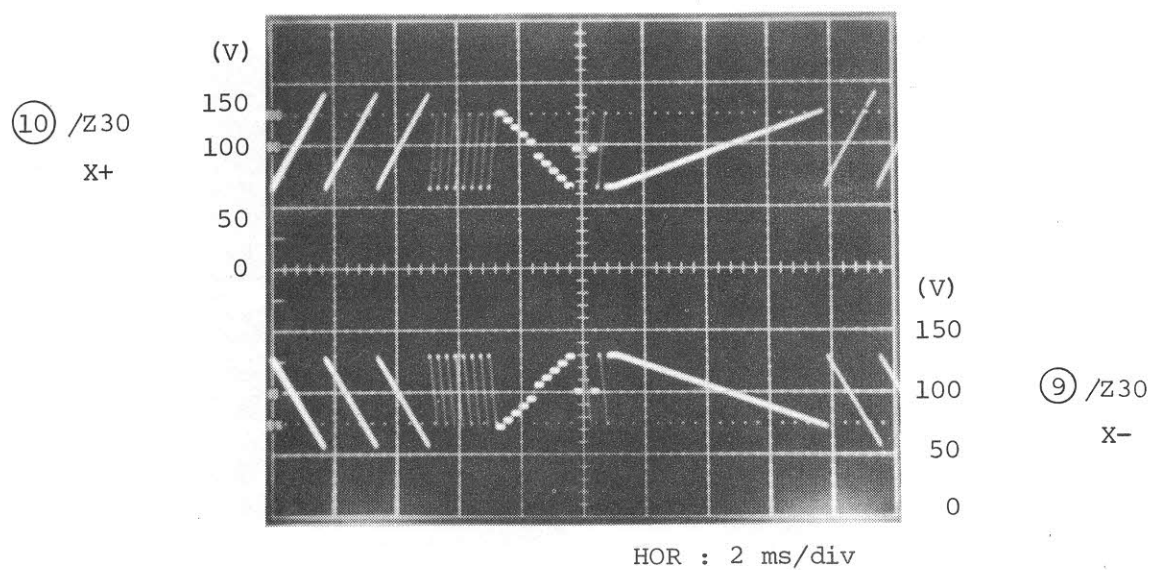


Fig. 5-90 X-AMP OUTPUT

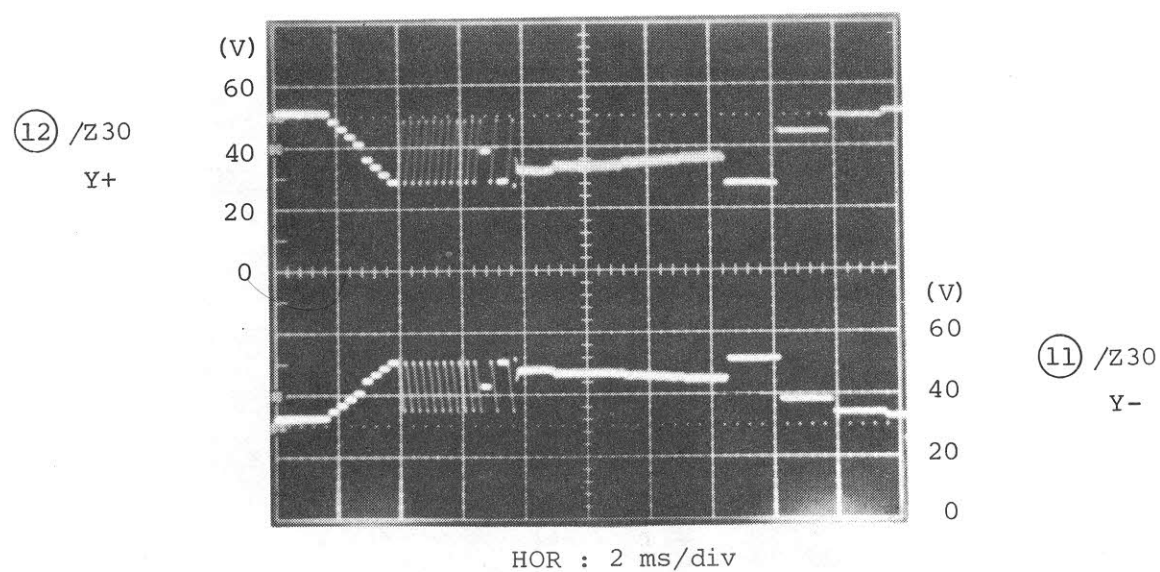
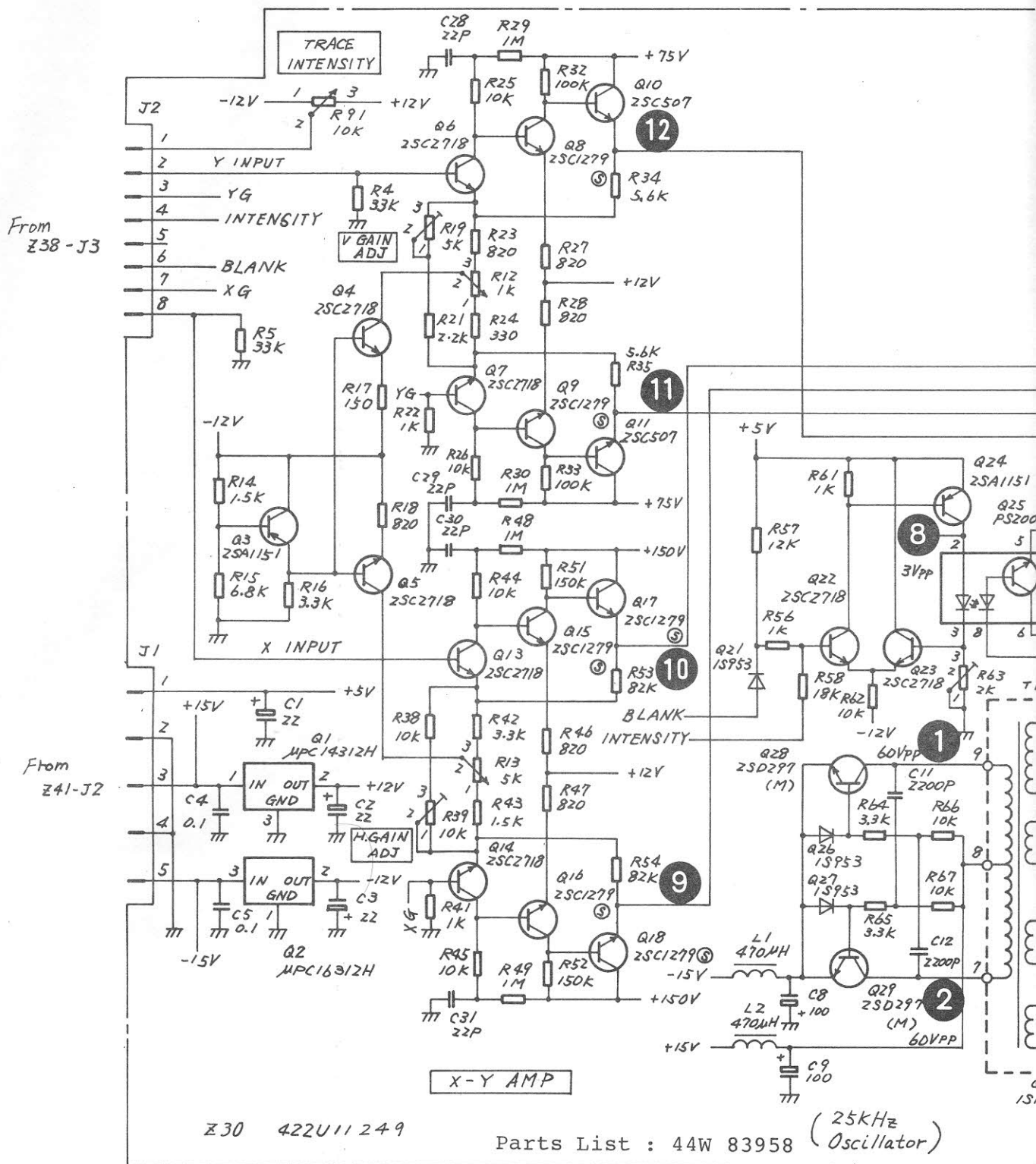


Fig. 5-91 Y-AMP OUTPUT



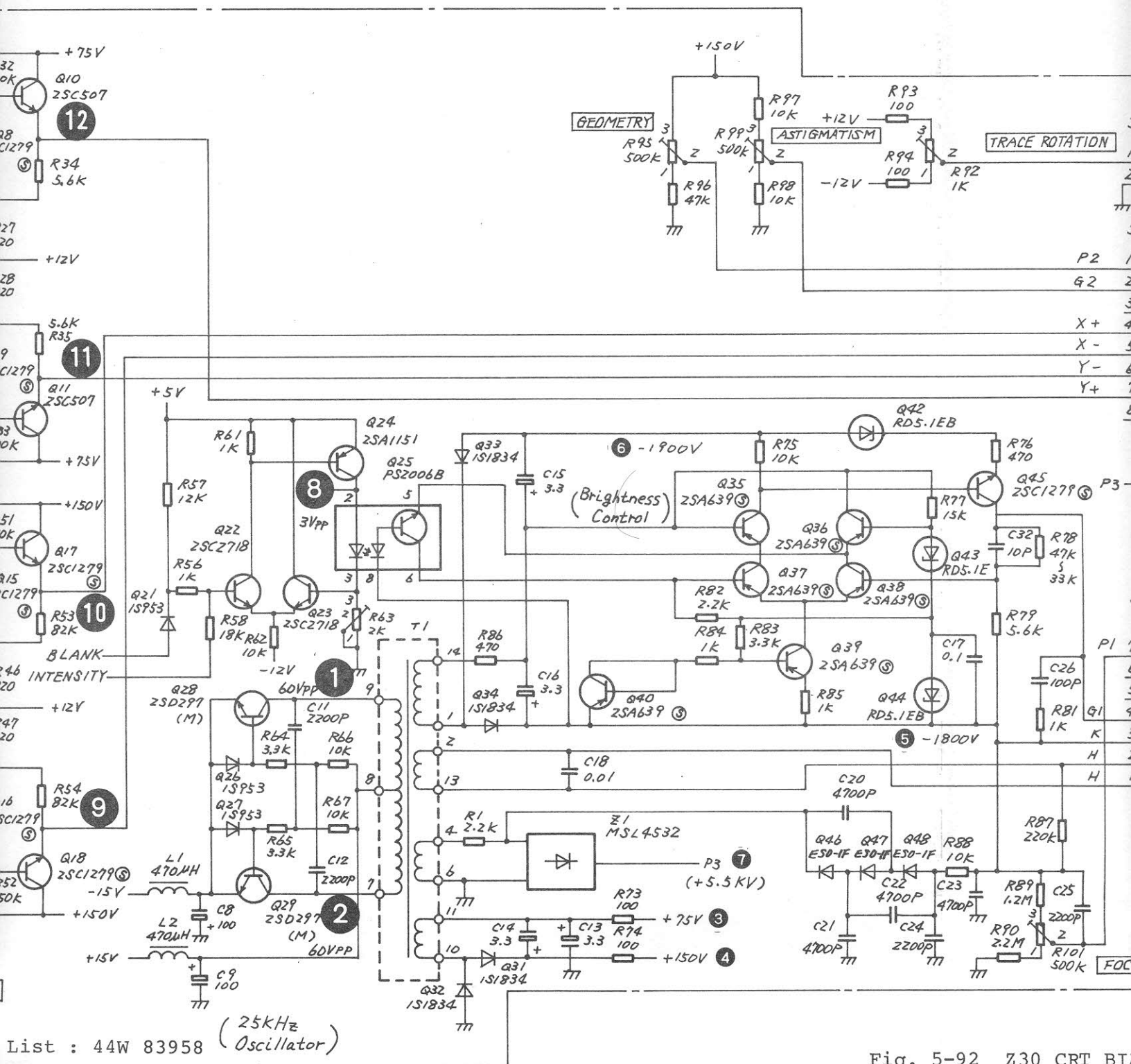


Fig. 5-92 Z30 CRT Beam Amp Circuit (43W 33961)

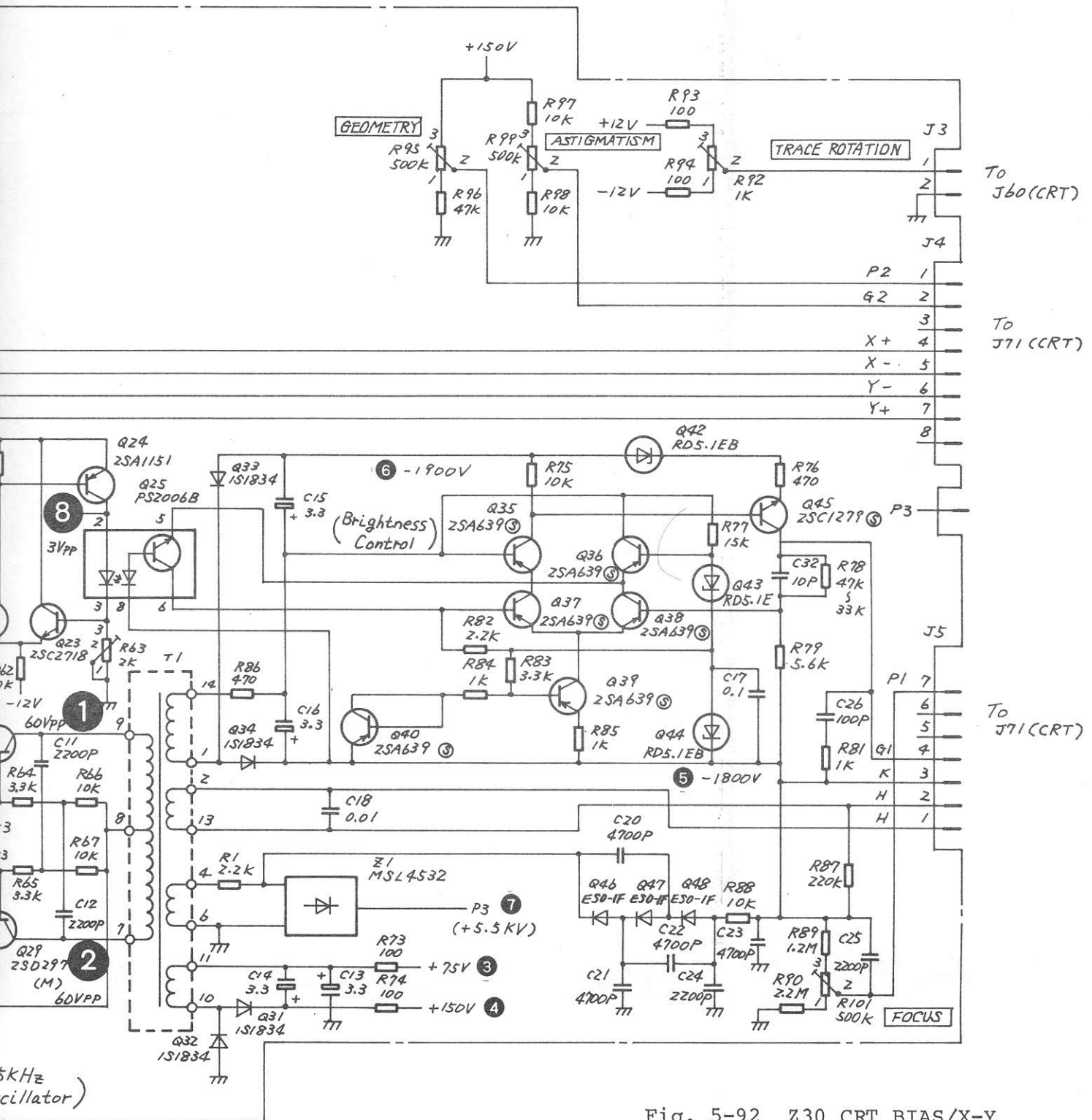


Fig. 5-92 Z30 CRT BIAS/X-Y  
AMP Circuit Diagram  
(43W 33961)

5-267/(5-268 blank)

## 5.18 Z32 SWITCHING REGULATOR

### 5.18.1 Circuit description - Z32

(Refer to Fig. 3-3 (3/4) and Fig. 5-98)

The dc power for the MS710[ ] components are all supplied from this regulator.

Z32 has three switching regulator circuits for +15 V output, +5 V output, and -15 V output; all have similar structures.

As an example, the +15 V output circuit is explained below. The low voltage ac current supplied from the secondary-side winding of the T1 power transformer is rectified by the Q8 rectifier bridge.

The ripple components are reduced by the smoothing circuit that consists of C1, L1, C5, and C6.

The circuit around Q1 to Q6 and L3, C7 forms the chopper-type switching regulator circuit. The output voltage is divided by R2, R3, and R4 and is added to the negative input terminal of comparator Q2. The reference voltage generated by the Q1 zener diode is applied to the positive input terminal of the comparator. Therefore, when the output voltage drops, the comparator output voltage is increased and the Q3 transistor is switched on. As a result, the base potential of transistor Q4 decreases and the Q4 and Q5 transistors are switched on. Then the current flows to the load side and the output voltage is increased.

However, when the output voltage increases, the output voltage of comparator Q2 decreases and the Q3, Q4, and Q5 transistors are switched off. The output voltage is then no longer increased.

Consequently, constant voltage output is obtained by repeating this switching at a fixed cycle.

L4 and C10 or L5 and C9 are filters used to reduce the switching frequency ripple components contained in the output.

The circuit around Q28 and Q29 is the series regulator circuit. This circuit regulates dc power to the Z6/Z16 M/N VCO circuit where high-frequency signals with good purity are generated.

Q32 is the dc power voltage monitoring IC that generates the resetting signals during a fixed period of time (approximately 100 ms) when the power switch is turned on. Q32 also quickly detects any drop in +5 V output voltage when the power switch is turned off. It outputs a low-level logic signal and generates the PDN signal to prevent the contents of the memory from being destroyed when the dc power supply is switched to the backup battery.

#### 5.18.2 Checking procedure - Z32

Step	Procedure
1.	Observe the voltage waveforms at checkpoints ① to ⑪ which is shown in Figs. 5-93 and 5-98.  Compare these voltage waveforms at ① to ⑨ with the normal waveforms shown in Figs. 5-94 to 5-96.
2.	Observe the waveforms at checkpoints ⑩ and ⑪ on the storage oscilloscope and confirm that the power monitoring circuit is operating normally as shown in Fig. 5-97.



### 5.18.3 Adjustment - Z32

The variable resistors used to adjust output voltages +15 V, +5 V, and -15 V are R3, R66, and R30, respectively. Measure the output voltage with a digital voltmeter and adjust them to the specified value.



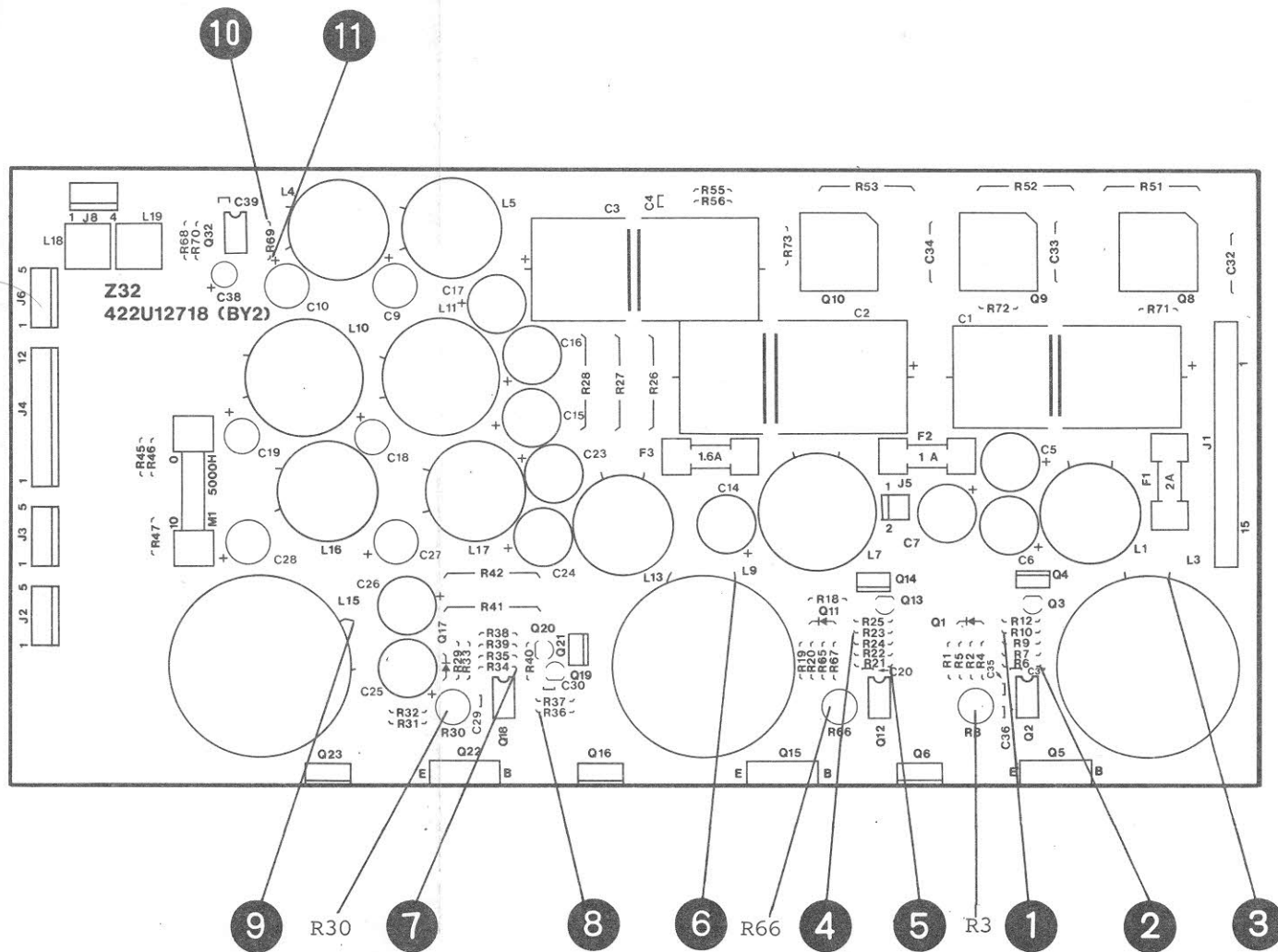
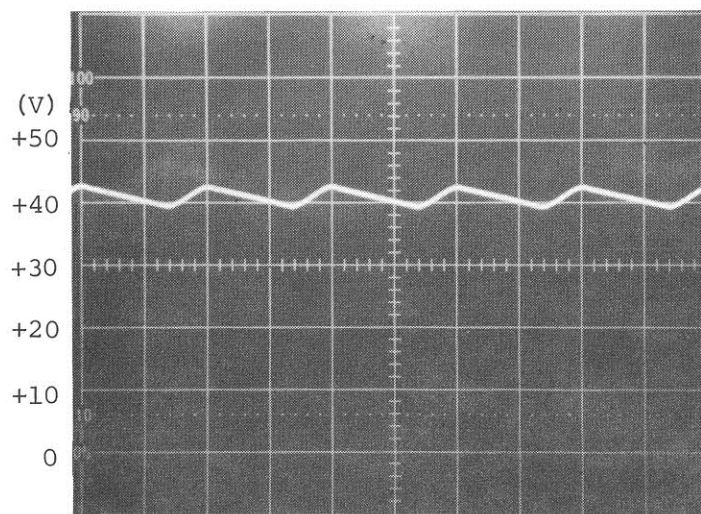


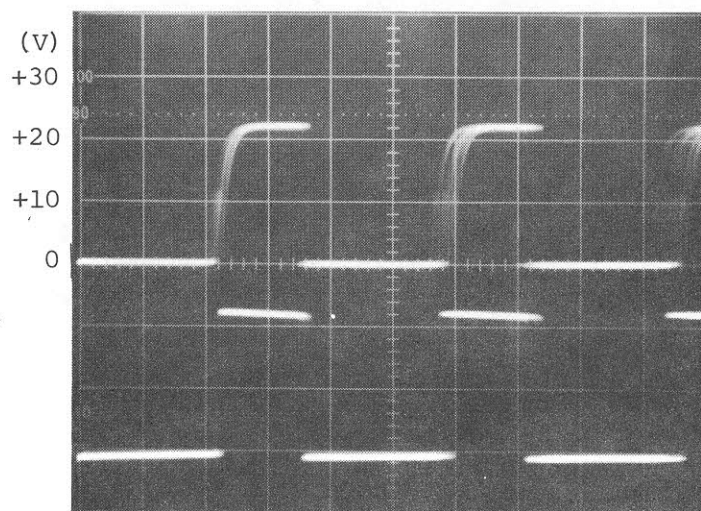
Fig. 5-93 Z32 Parts Layout

① /Z32



HOR : 5 ms/div

② /Z32

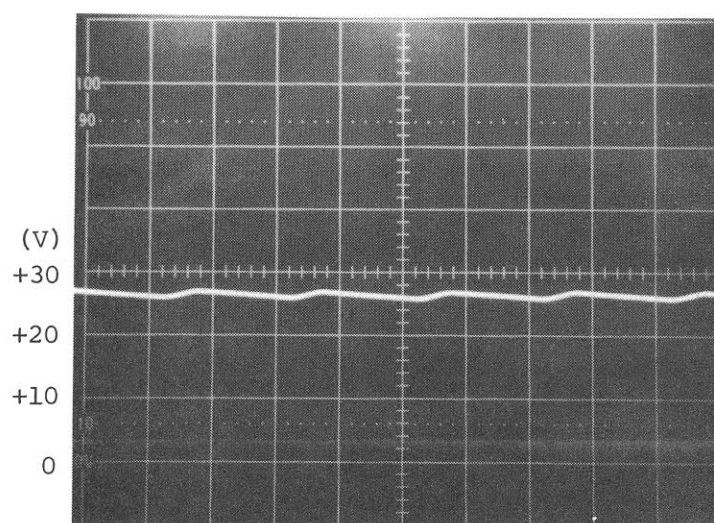


HOR : 20  $\mu$ s/div

③ /Z32

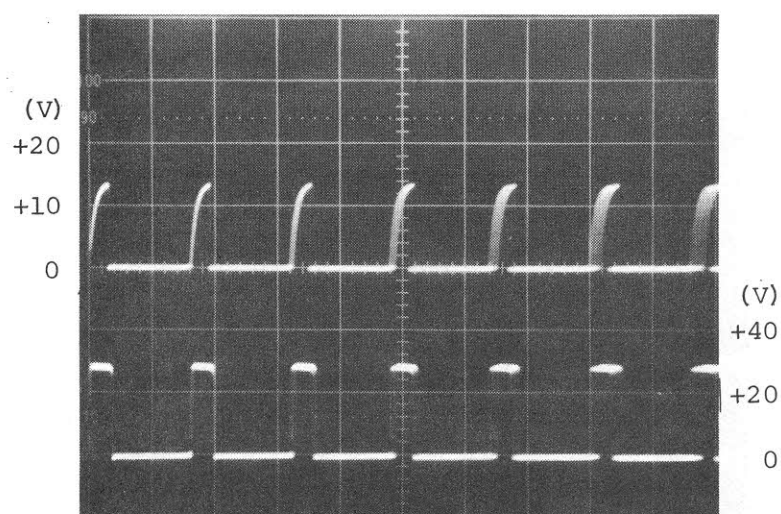
Fig. 5-94 +15 V Regulator

④ /Z32



HOR : 5 ms/div

⑤ /Z32



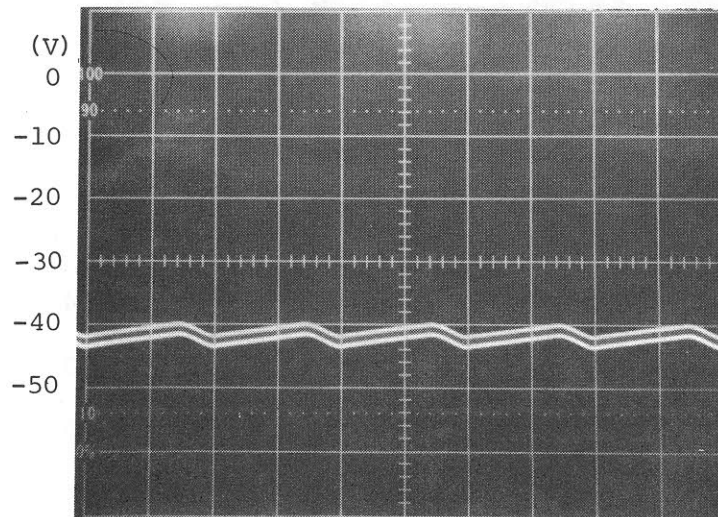
HOR : 20 μs/div

⑥ /Z32

(V)  
+40  
+20  
0

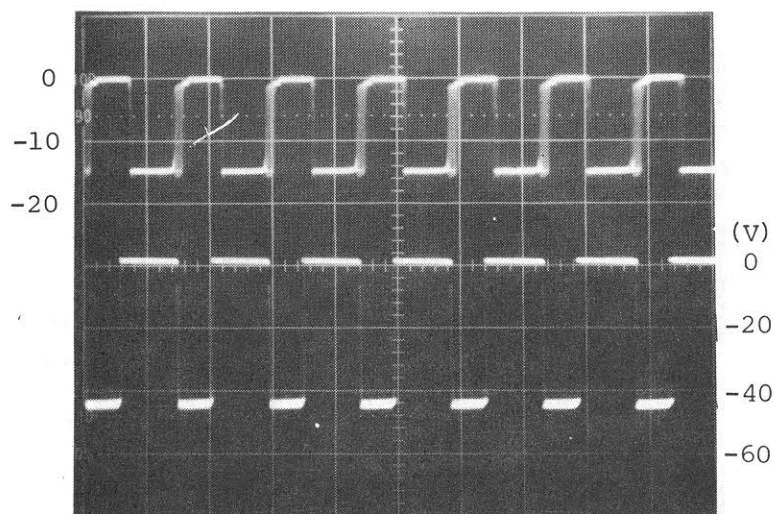
Fig. 5-95 +5 V Regulator

⑦ /Z32



HOR : 5 ms/div

⑧ /Z32

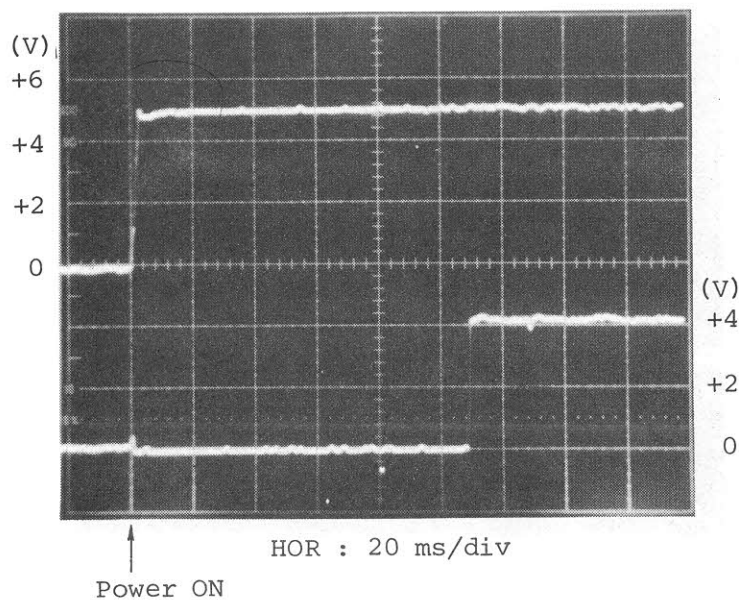


HOR 20  $\mu$ s/div

⑨ /Z32

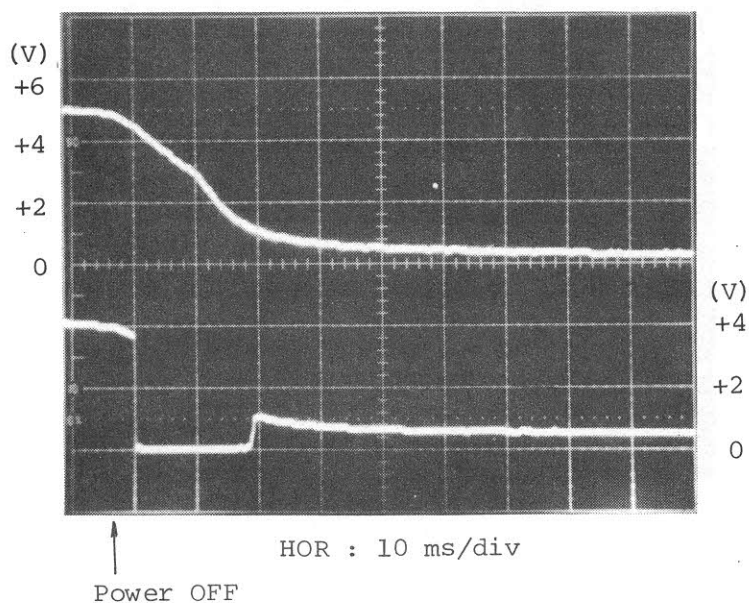
Fig. 5-96 -15 V Regulator

⑩ /Z32  
+5 V



⑪ /Z32  
PDN

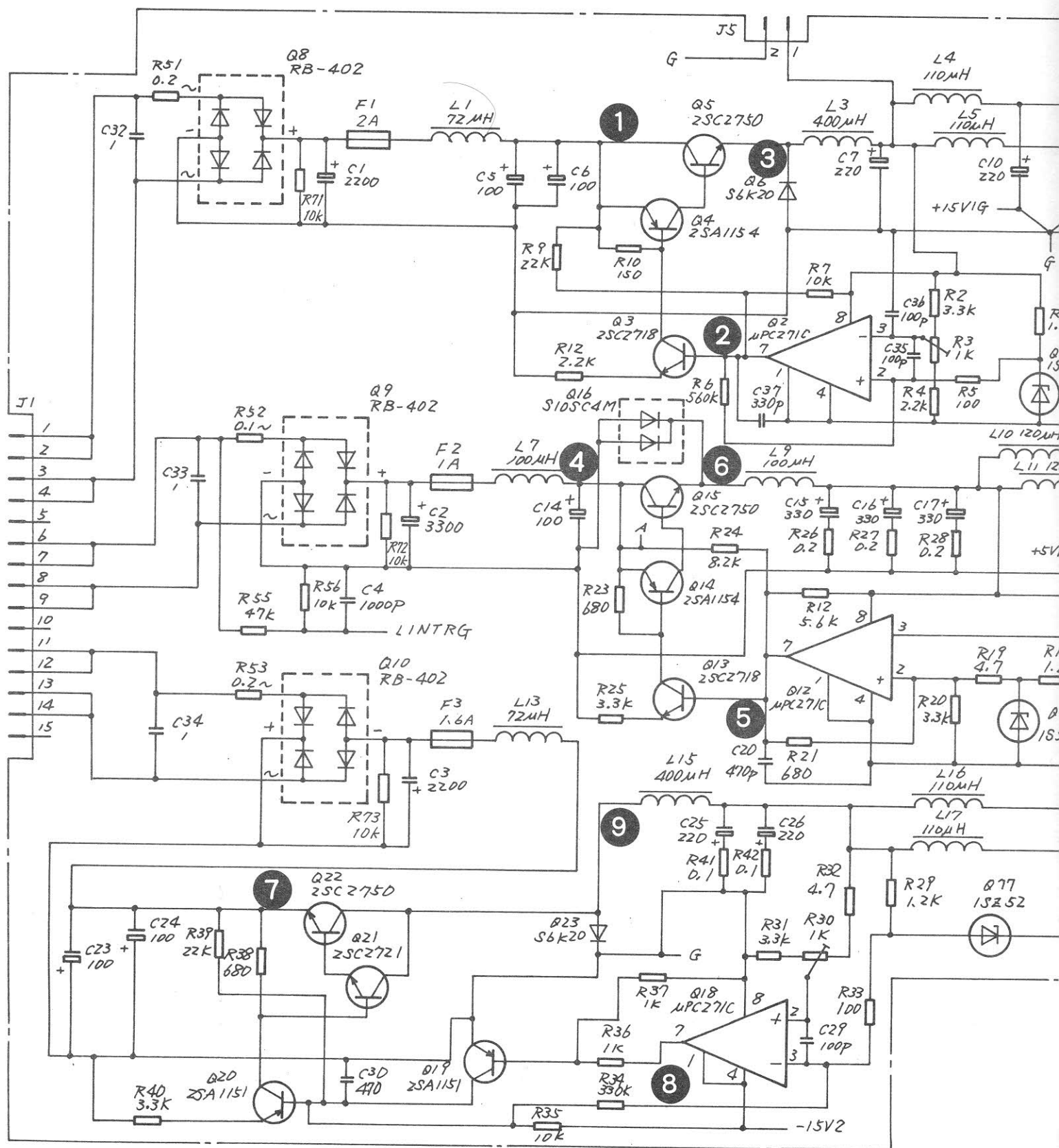
⑩ /Z32  
+5 V



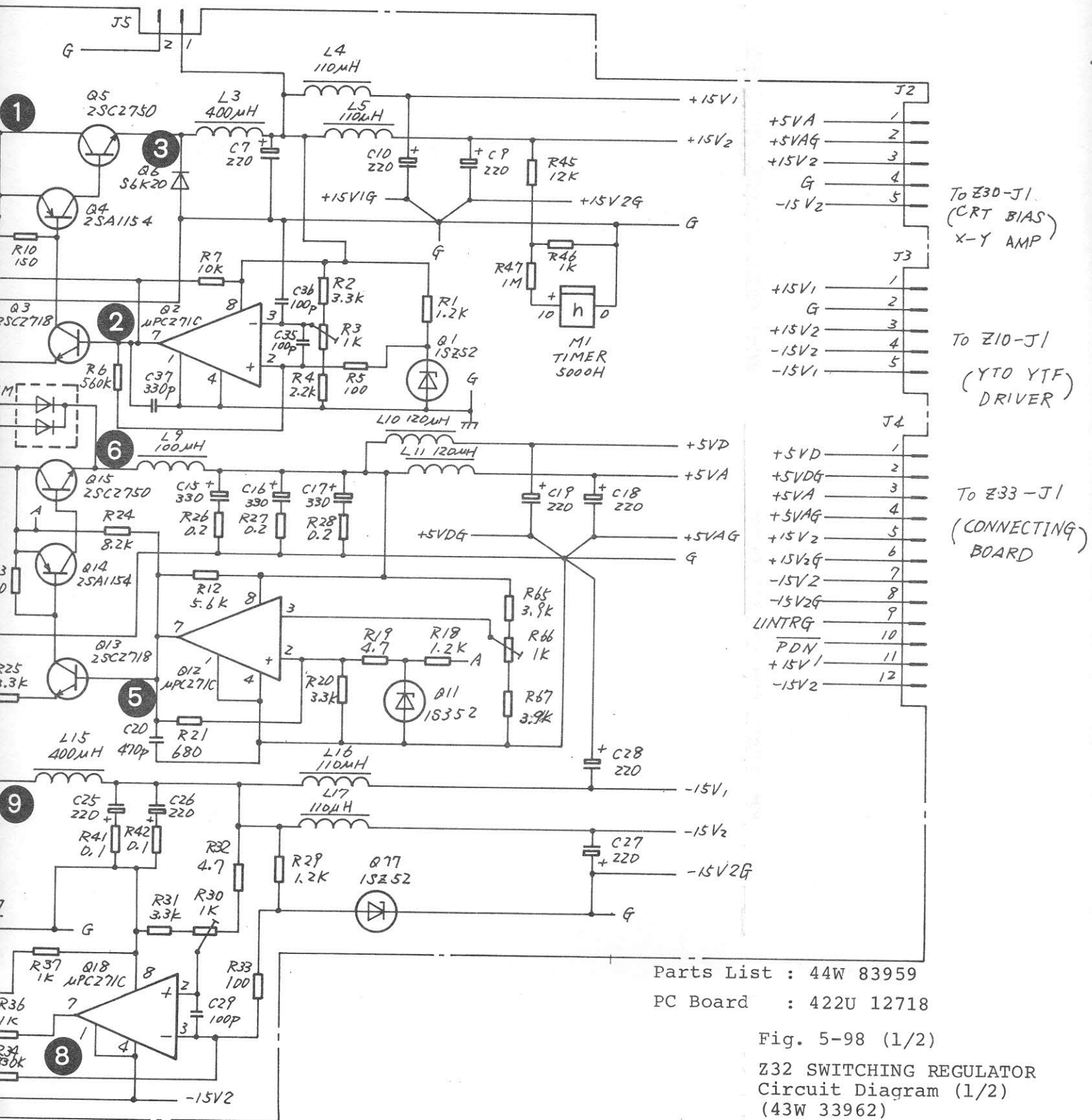
⑪ /Z32  
PDN

Fig. 5-97 Power ON Reset/Power Down Detector

From T1  
(J65)







5-277/(5-278 blank)

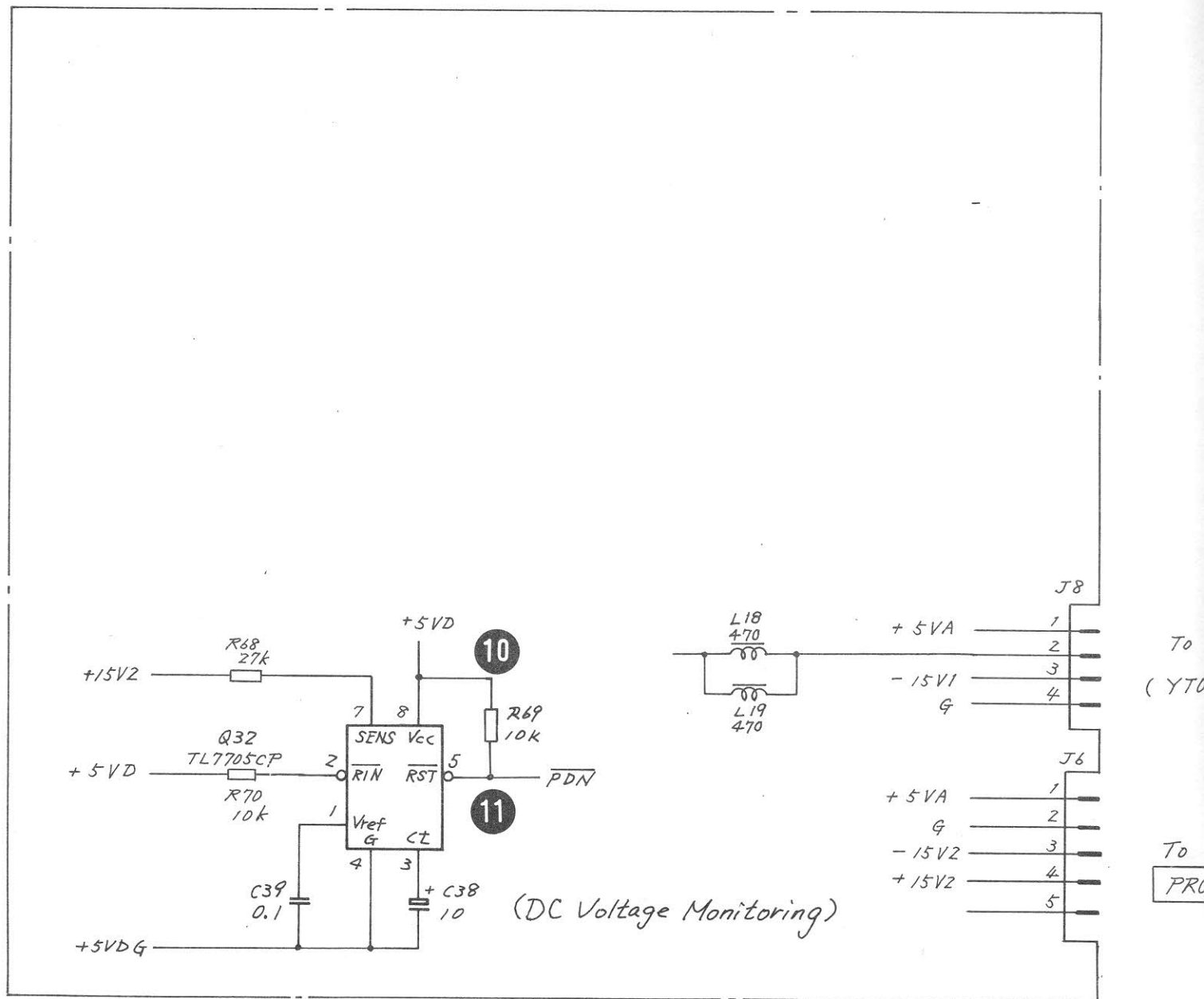


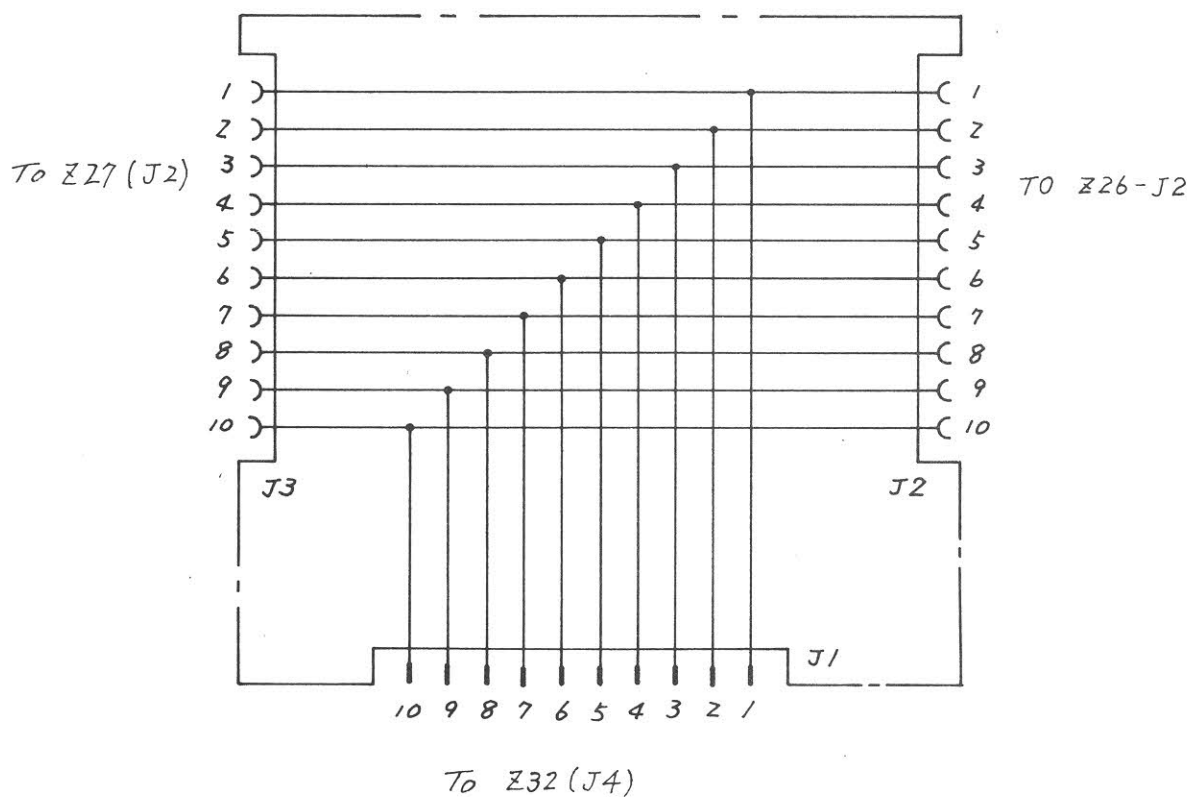
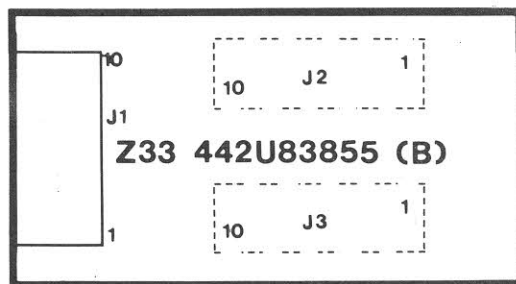
Fig. 5-98 (2/  
Z32 SWITCHING  
Circuit Diagram  
(43W 33962)

5-279/(5-2



5-279/(5-280 blank)

# 5.19 Z33 CONNECTION BOARD



PC Board : 442U 83855

Parts List : 44W 83960

Fig. 5-99 Z33 CONNECTION BOARD Circuit Diagram and Parts Layout (44W 84120)

## 5.20 Z34 DIGITAL MEMORY/GP-IB

### 5.20.1 Circuit description - Z34

(Refer to Fig. 3-3 (3/4) and Fig. 5-106)

This circuit samples and A/D converts the video signal, and outputs it to the CRT display memory (RAM); it controls the operation which performs data communication with the external devices through the GP-IB or PARALLEL INTERFACE. This circuit also generates the preselector auto tuning signal which is sent to the Z10 YTO/YTF driver and drives Z3 RF ATT.

The Z34 circuit is divided into the 8 parts (A) to (H), shown in Fig. 5-106, and a circuit description is given for each part as follows:

#### Part (A): VIDEO SIGNAL PROCESSORS

The video signal input through J1 is sampled and A/D converted together with the sample timing signal (DSPC) from the Z26 CPU board so that a 501 waveform data sample value per sweep is obtained.

In the normal mode, when the signal component is detected within one sampling period, the positive peak (PP) value of the video signal is sampled, and when no signal component is detected, the PP value and negative peak (NP) value are sampled alternately at each sampling. This is done to correctly reproduce the amplitude of both the signal component and the noise component.

In the MAX HOLD mode, the positive peak value of the video signal is always sampled. Moreover, in the AVERAGE mode, at the period judged to be the signal component, the PP value is sampled, and at the period judged to be the noise component only, peak hold is not performed and the video signal value itself at that time (SMP value) is sampled.

The circuit including Q71 to Q75 is the positive peak hold circuit for detecting the PP value and the circuit including Q81 to Q85 is the negative peak hold circuit for detecting the NP value.

The circuit including Q58, Q70, Q61, Q62, Q78, and Q87 is the circuit which performs signal and noise judgement. Q63 and Q64 are the switch circuit for selecting the NP, PP, and SMP signals. Q66 is the sample and hold circuit for holding the selected sampling voltage during A/D conversion.

Part (B): A/D CONVERTER AND SAMPLING CONTROL

Besides performing waveform data A/D conversion in synchronization with DSPC as described above, when the sweep time is long (DSPC period is long), the PP value is sampled every 160  $\mu$ s in synchronization with the CLK40 signal for performing peak hold digitally.

The circuit including Q53 to Q56 generates the timing which controls the starting of the A/D converter. Q57 is an A/D converter having a 10-bit resolution and a 35  $\mu$ s conversion speed. Whether conversion is being performed or not is indicated by the STATUS signal (H level: A/D conversion being performed).

At the end of A/D conversion, the A/D converter output is latched in Q68 and Q69 by the pulse signal generated by monostable multivibrator Q56 and, at the same time, an interrupt request signal (IRQ0 or IRQ3) is generated for the Q2 interrupt controller. When this interrupt request is accepted by the Q27 microprocessor, the A/D conversion output latched in Q68 and Q69 is read to the microprocessor through Q51 PIO 1.

Parts (C), (D), and (E): MICROPROCESSOR, PERIPHERAL  
CIRCUIT FOR CPU, and EXTERNAL  
INTERFACE

Fig. 5-106 (3/8) shows the microprocessor and its clock generator circuit. Fig. 5-106 (4/8) shows the microprocessor peripheral ADDRESS DECODER, ROM, RAM, TIMER, and INTERRUPT CONTROL circuits. The control circuit of the PARALLEL INTERFACE and GP-IB which are used to interface with external devices is shown in Fig. 5-106 (5/8). LSI Q46 is used for GP-IB control.


Parts (F), (G), and (H): LS 2 bit MEMORY FOR TRACE DATA,  
MARKER CONTROL AND PRESELECTOR  
TUNE, and ATT/SW DRIVER

Fig. 5-87 (6/8) shows the DISPLAY RAM which stores the least significant 2 bits of the waveform data and its access control circuit. This DISPLAY RAM memory is integrated with the Z27-Q13 most significant 8-bit memory and forms a 10-bit memory for waveform display. It can also be accessed from the Z27 display control circuit. The Q122 for the marker function, its access control circuit, and the D/A converter (Q127) circuit which is the programmable voltage generation circuit for performing preselector auto tuning are shown in Fig. 5-106 (7/8).

The DRIVER circuit for driving the Z3 RF ATT/SW with the control signals sent from the Z26 CPU board through J1 is shown in Fig. 5-106 (8/8).

### 5.20.2 Checking Procedure - Z34

Step	Procedure								
1.	<p>Add the 100 MHz CAL OUTPUT signal to the RF input, and set as follows.</p> <table><tr><td>FREQUENCY BAND</td><td>100 k to 2 GHz</td></tr><tr><td>CENTER FREQUENCY</td><td>100 MHz</td></tr><tr><td>SPAN/DIV</td><td>1 MHz/div</td></tr><tr><td>REFERENCE LEVEL</td><td>-10 dBm</td></tr></table>	FREQUENCY BAND	100 k to 2 GHz	CENTER FREQUENCY	100 MHz	SPAN/DIV	1 MHz/div	REFERENCE LEVEL	-10 dBm
FREQUENCY BAND	100 k to 2 GHz								
CENTER FREQUENCY	100 MHz								
SPAN/DIV	1 MHz/div								
REFERENCE LEVEL	-10 dBm								
2.	<p>Using an oscilloscope, observe the TP7 video signal waveform and the signal waveform of SWPOFF of ❶ (Q99-1). Confirm that they are as shown in Fig. 5-101. If these waveforms are abnormal, the fault is probably before Z26.</p>								
3.	<p>Observe the TP6 and TP5 waveforms and check the positive peak hold and negative peak hold output waveforms. (Fig. 5-101)</p>								
4.	<p>Observe the TP2 and TP3 waveforms and confirm that the video signal is correctly sampled. (Fig. 5-101)</p>								
5.	<p>Observe the sequence waveforms at checkpoints ❷ to ❸ to confirm that the A/D converter operation timing is normal. Check whether they are as shown in Fig. 5-102.</p>								
6.	<p>Confirm that the ❹ and TP4 4 MHz clock signal (TTL level) is normal.</p>								
7.	<p>Confirm that the ❿ and ⓫ timer output waveforms are set as shown in Fig. 5-103.</p>								

Step	Procedure						
8.	<p>Input a 3 GHz, -10 dBm signal from a signal generator to the RF INPUT, and set as follows.</p> <table><tr><td>FREQUENCY BAND</td><td>1.7 G to 23 GHz</td></tr><tr><td>CENTER FREQUENCY</td><td>3 GHz</td></tr><tr><td>SPAN/DIV</td><td>1 MHz/div</td></tr></table>	FREQUENCY BAND	1.7 G to 23 GHz	CENTER FREQUENCY	3 GHz	SPAN/DIV	1 MHz/div
FREQUENCY BAND	1.7 G to 23 GHz						
CENTER FREQUENCY	3 GHz						
SPAN/DIV	1 MHz/div						
9.	<p>Set the PRESELECTOR PEAK knob on the front panel to the center of the  mark.</p>						
10.	<p>Press the SHIFT + C (START) key switches (performs PRESELECTOR AUTO TUNING) and confirm that the ⑫ ADSMP and ⑬ P. Peak waveforms are as shown in Fig. 5-104. However, the voltages of the P. Peak waveform before and after AUTO TUNING do not be the same ordinarily. (In Fig. 5-104, the voltages happens to be the same, unexpectedly.)</p>						
11.	<p>Press the INPUT ATTEN switch, turn the data knob, and confirm the drive signal waveforms for each section of the ATT/SW DRIVER when the attenuator is switched. An example of a control signal for SEC 1 is shown in Fig. 5-105. It is the same for the other sections.</p>						

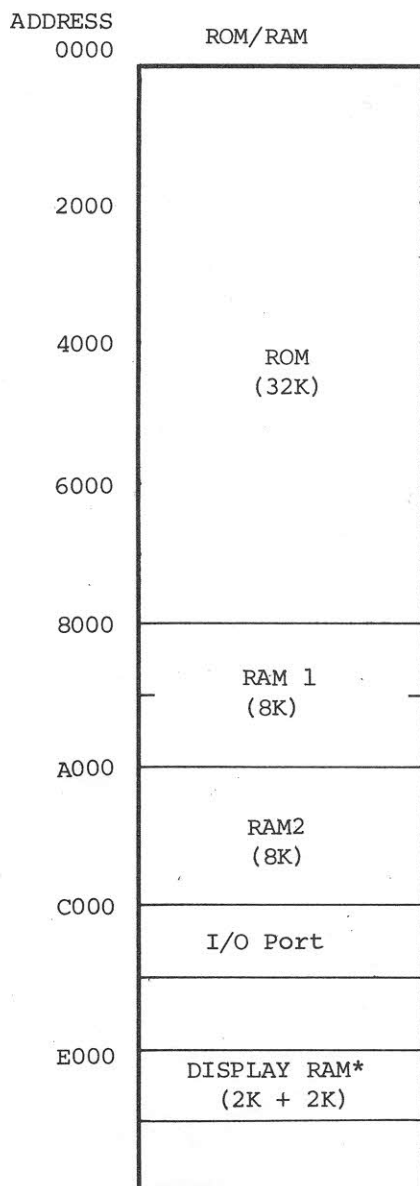
### 5.20.3 Adjustment - Z34

(Prior to this adjustment, perform adjustment of the Z27 Display Section.)

Step	Procedure
1.	Leave the Video input to Z26 (J7) open.
2.	Connect Z34 TP7 (Video input) to analog GND. Under the above conditions, adjust the offset with R44, R34, and R22 so that the voltage of TP5, TP6, and TP2 is 0 V.
3.	Under the above conditions, confirm that the CRT indication indicates 0. (Trace is on the bottom scale line.)
4.	Apply +4 V from the standard dc power source across TP7; adjust R33 so that the CRT indication coincides with the top scale line. Next, adjust R43 so that the voltage at TP5 is +2 V.
5.	Confirm the CRT trace movement at every graduation by performing input voltage variation on TP7 in 0.5 V steps.
6.	Adjust R75 so that the display line becomes the center of the noise during AVERAGE display mode.



Table 5-5 SUB CPU ADDRESS MAP



ADDRESS	Port Name	I/O	CONTROL
I/O F8	INTC 0	I/O	Interrupt Controller μPD8259
" F9	INTC 1	I/O	
I/O FC	CTC 0	I/O	Timer Clock CLK 40
" FD	CTC 1	I/O	
" FE	CTC 2	I/O	
" FF	CTC 3	O	
C010	PIO1 A	O	Sampling Control
C011	PIO1 B	I	
C012	PIO1 C	I	
C013	PIO1 D	O	
C060	PIO2 A	I	GP-IB Address SW Parallel Interface Display, I/F Control PIO2 Control
C061	PIO2 B	O	
C062	PIO2 C	I/O	
C063	PIO2 D	O	
C070	GPIB 0	I/O	GP-IB Controller μPD7210
" 7	GPIB 7	I/O	
C000	PST	O	Preselector Tune

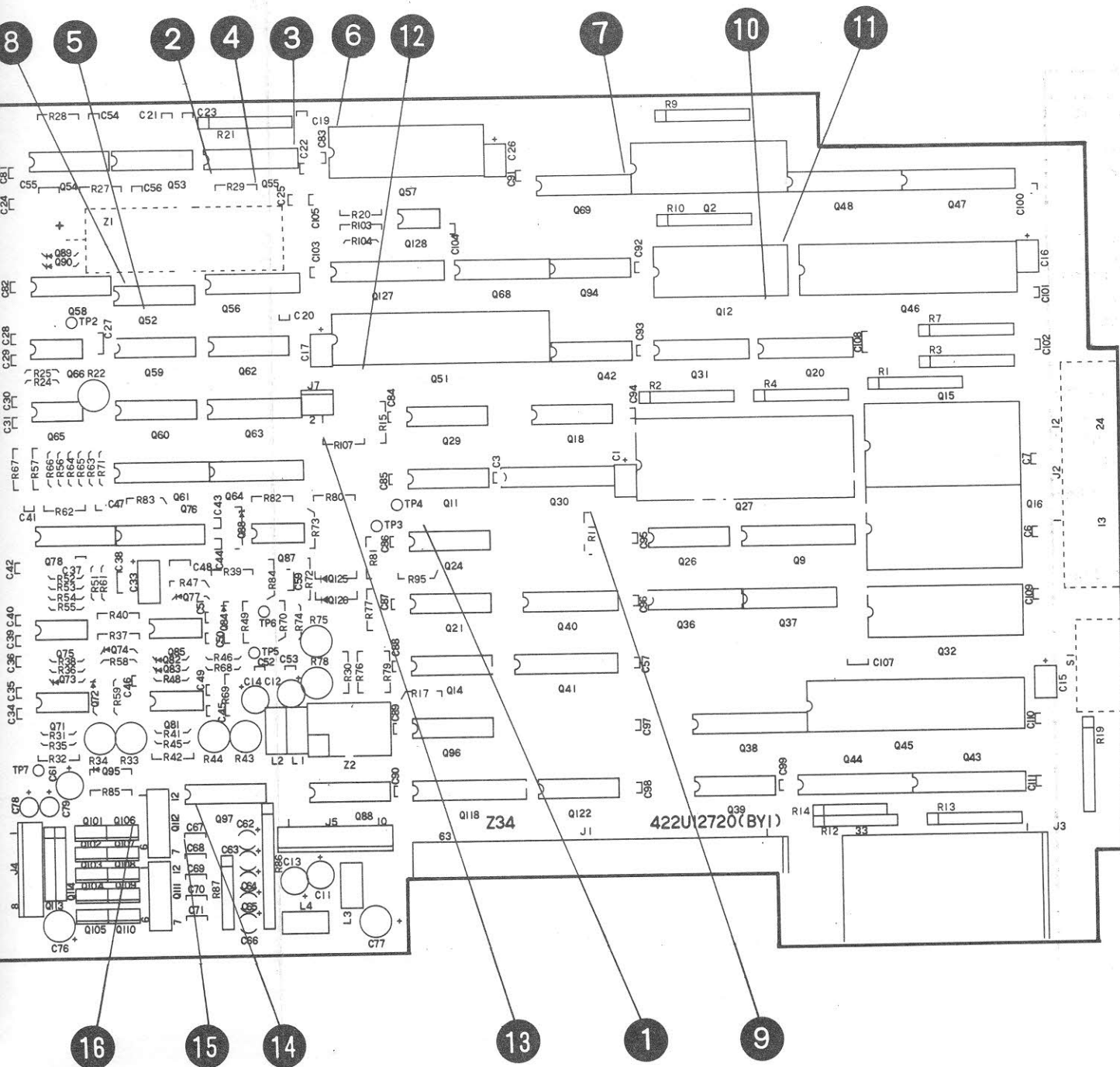
\* Odd Address : MS 8 bit  
Even Address : LS 2 bit



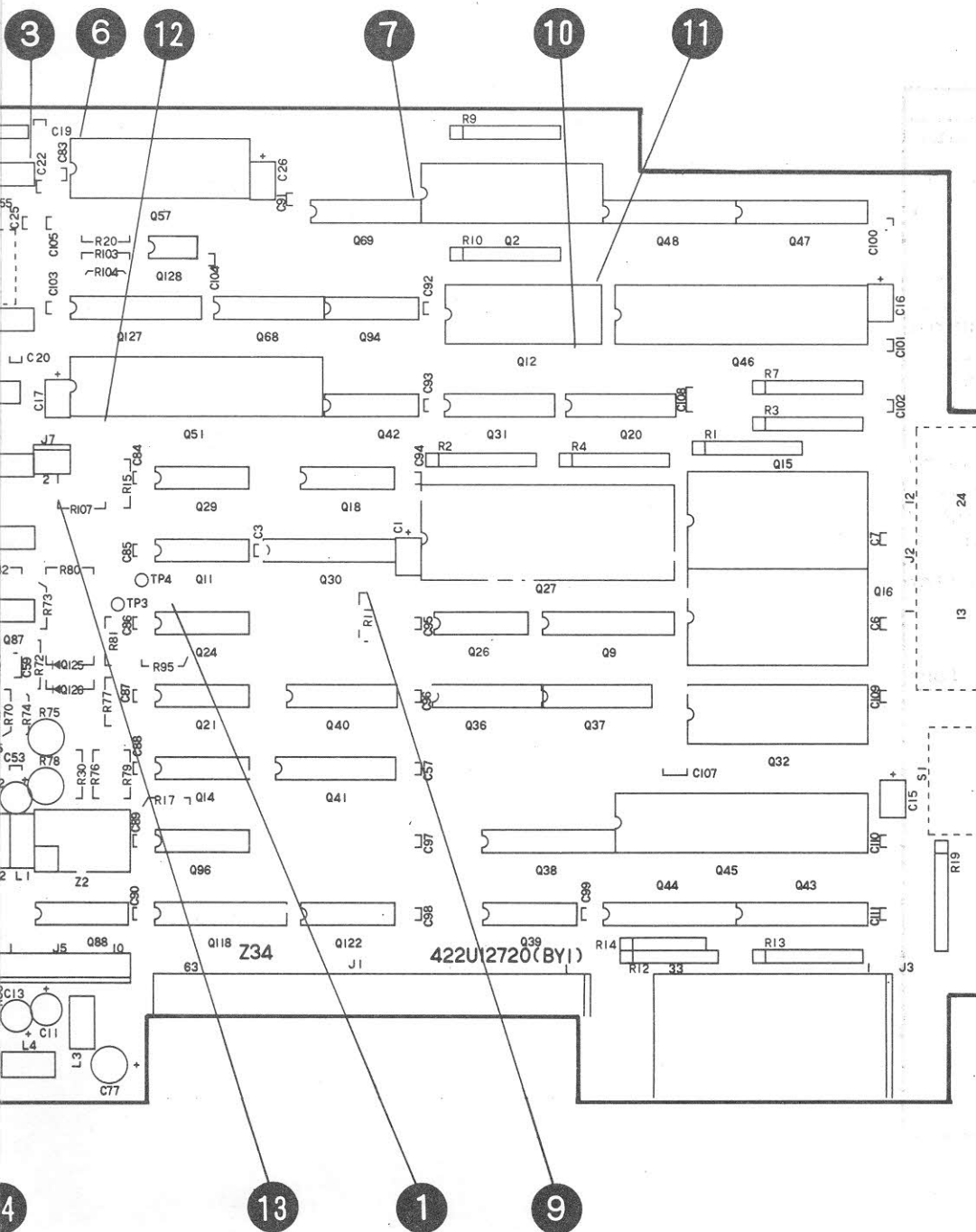
Address : 2N+1      Address : 2N

E001                  E000  
E003                  E002  
E005                  E004

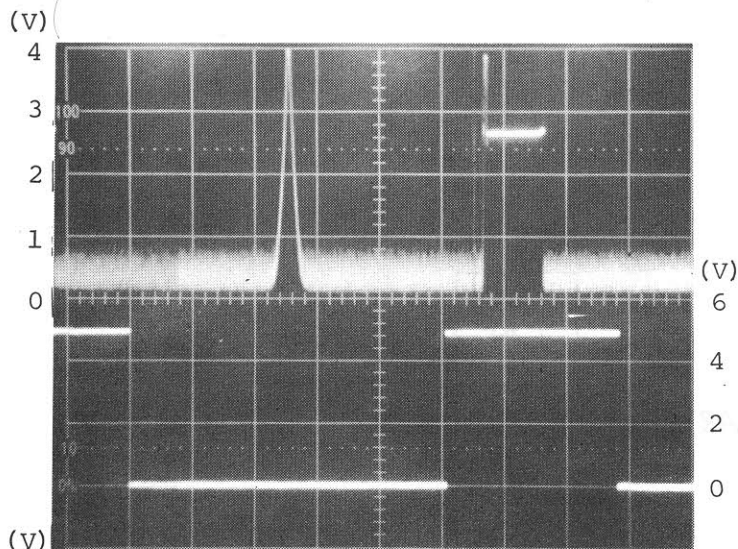
·                      ·  
·                      ·  
·                      ·



00 Z34 Parts Layout

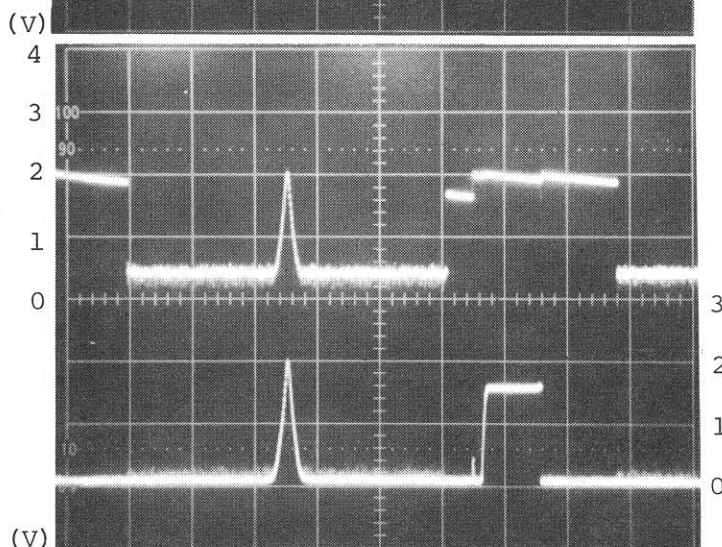


(TP7) /Z34  
VIDEO



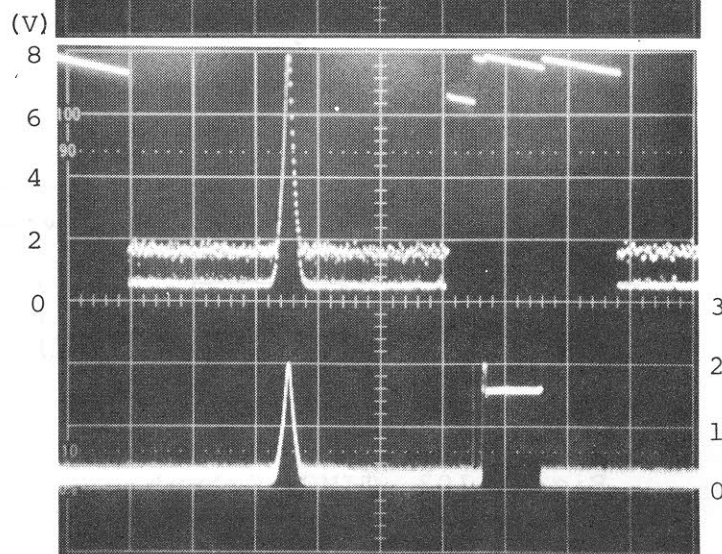
(1) /Z34  
SWPOFF

(TP6) /Z34  
PPK



(TP5) /Z34  
NPK

(TP2) /Z34  
ADIN



(TP3) /Z34  
SMP

HOR : 20 ms/div

SWEEP : OFF ON OFF ON

Fig. 5-101 Video Signal Processing

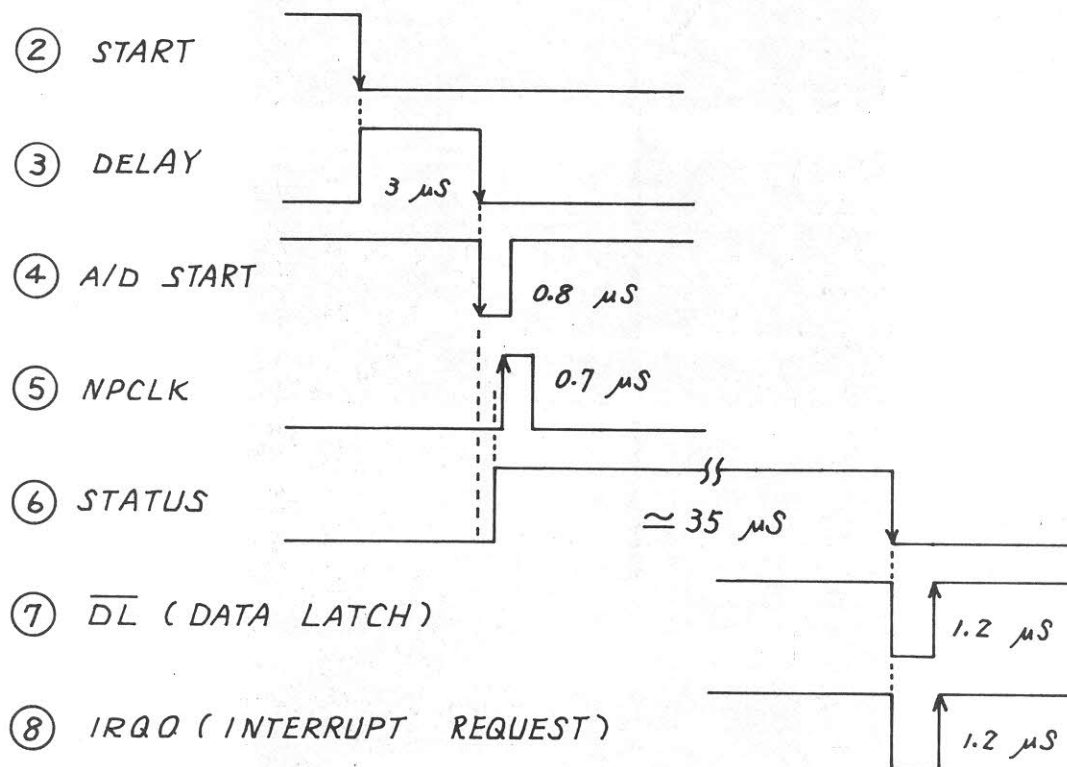


Fig. 5-102 A/D Converter Timing

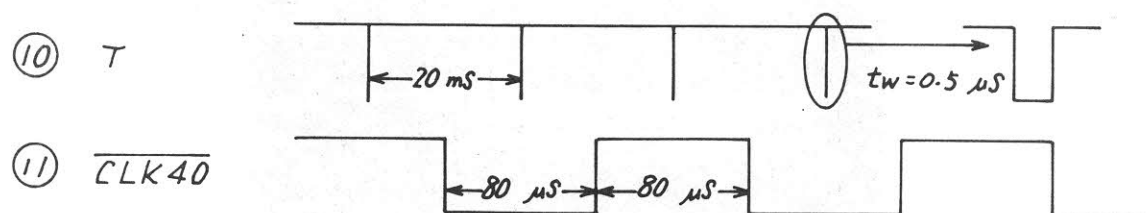
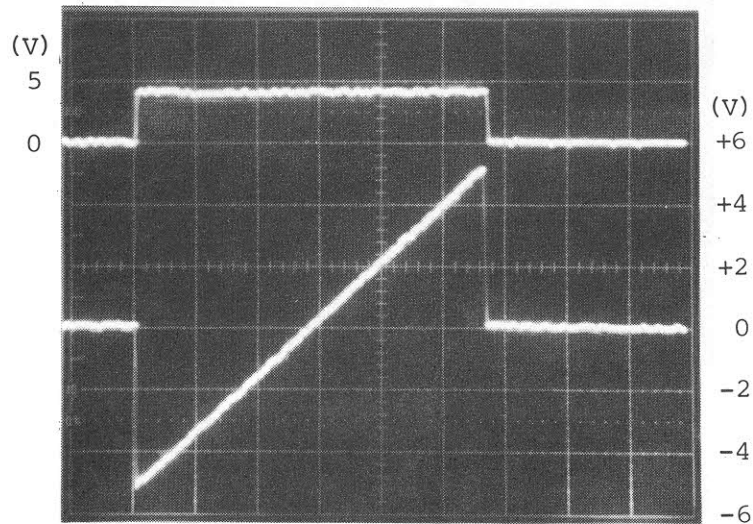


Fig. 5-103 TIMER Output

⑫ /Z34  
ADSMP

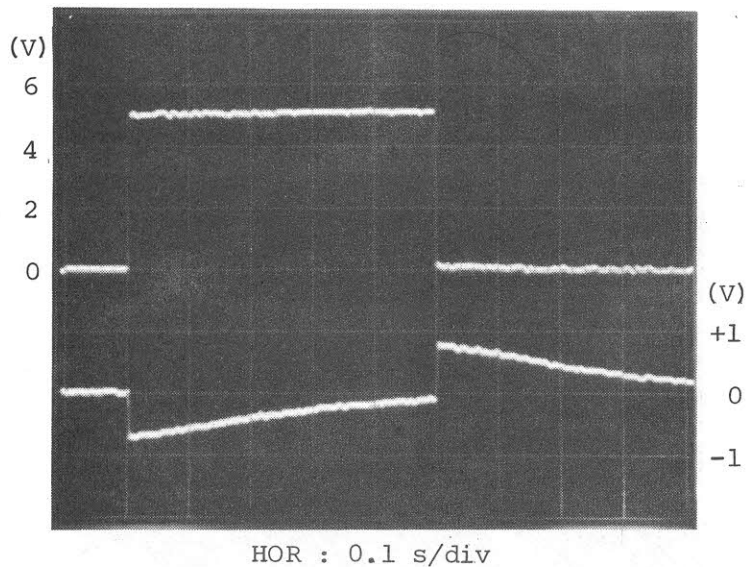


⑬ /Z34  
P.Peak

Preselector Auto OFF ON OFF

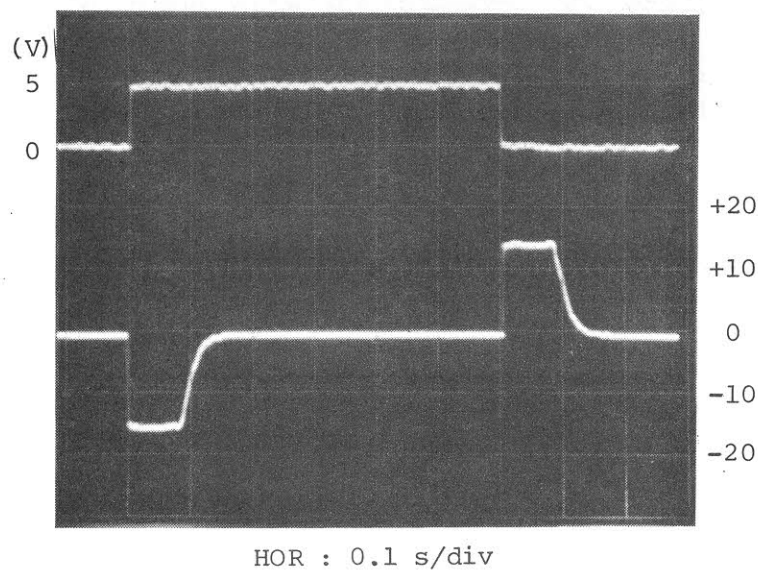
Fig. 5-104 Preselector Autotuning

⑭ /Z34  
ATTO



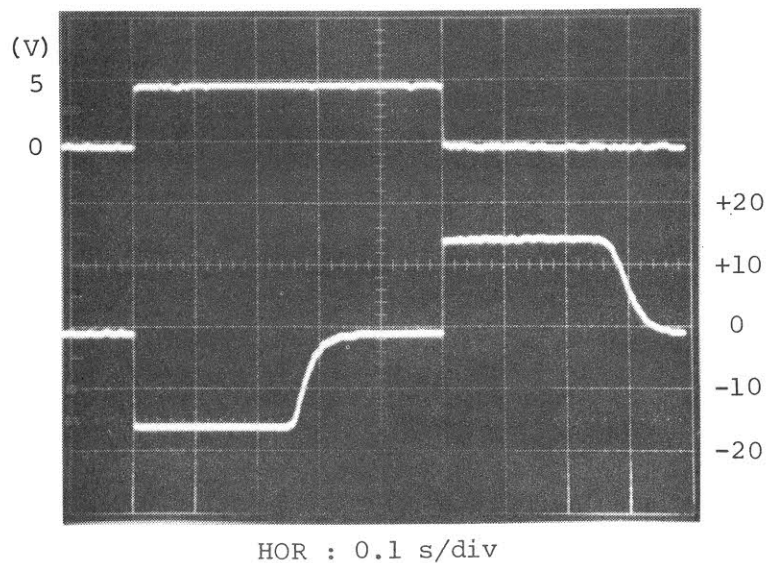
⑮ /Z34

⑭ /Z34  
ATTO



⑯ /Z34  
SEC 1

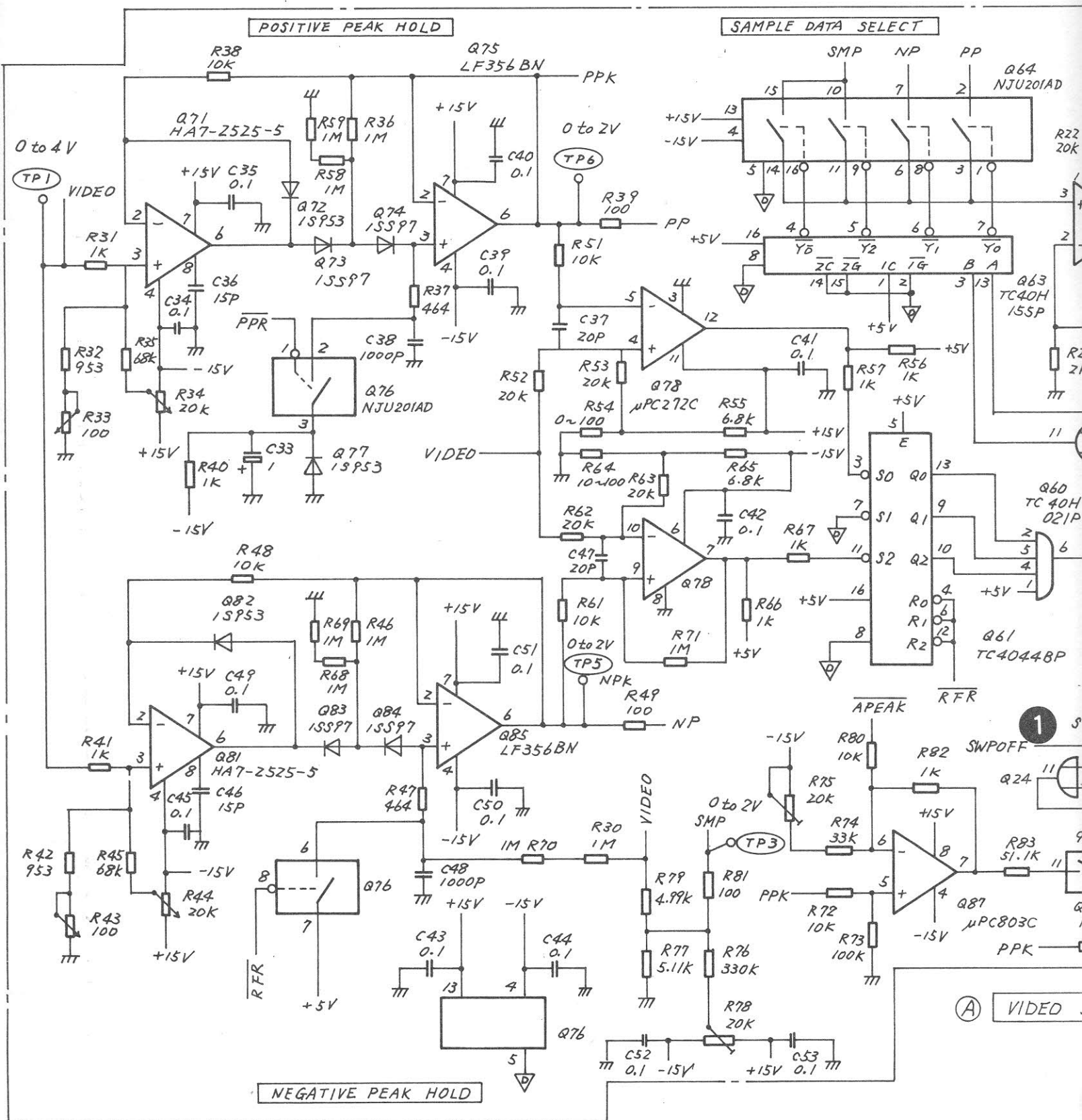
⑭ /Z34  
ATTO



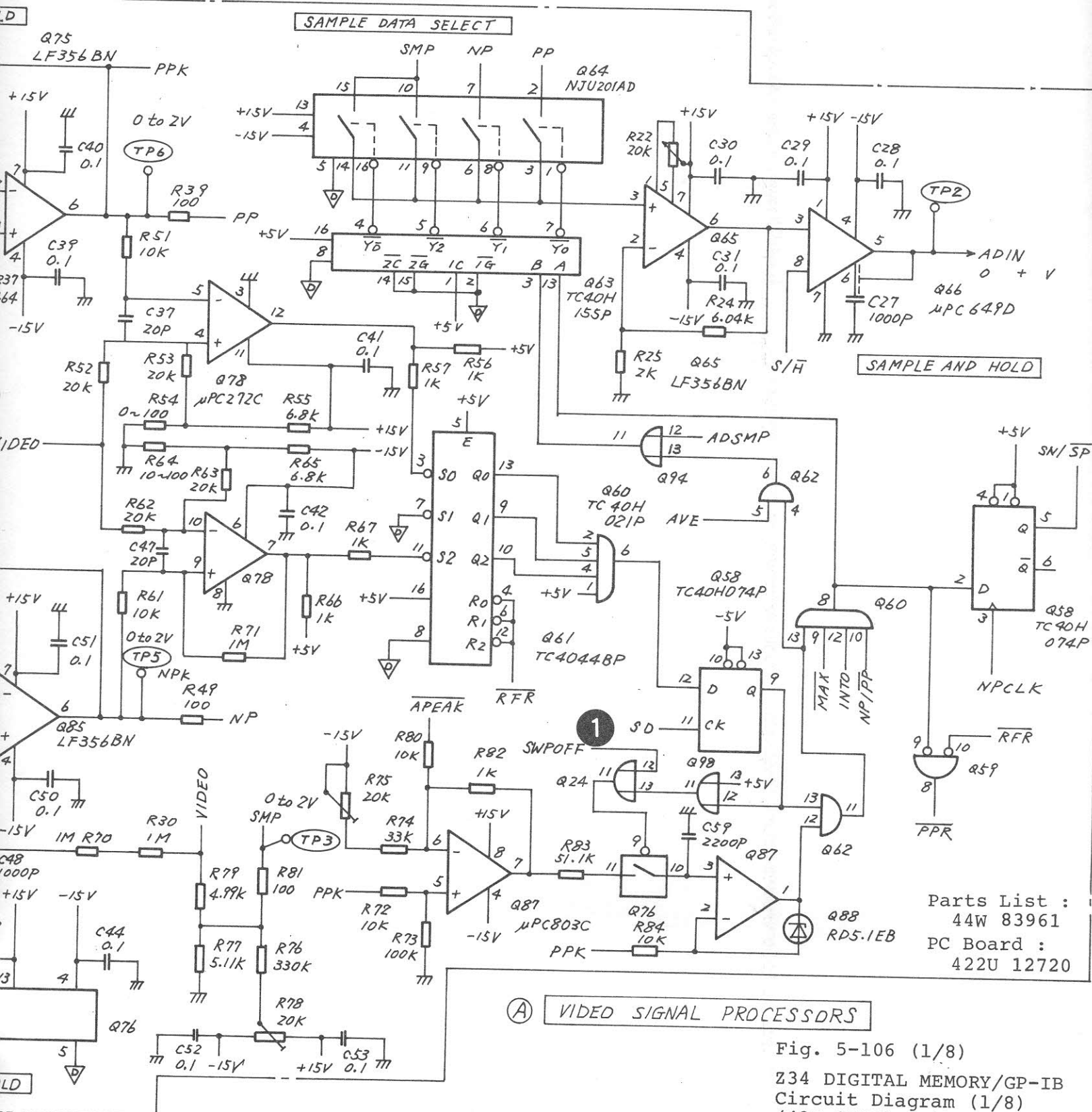
⑯ /Z34  
SEC 1  
(J4 OPEN)

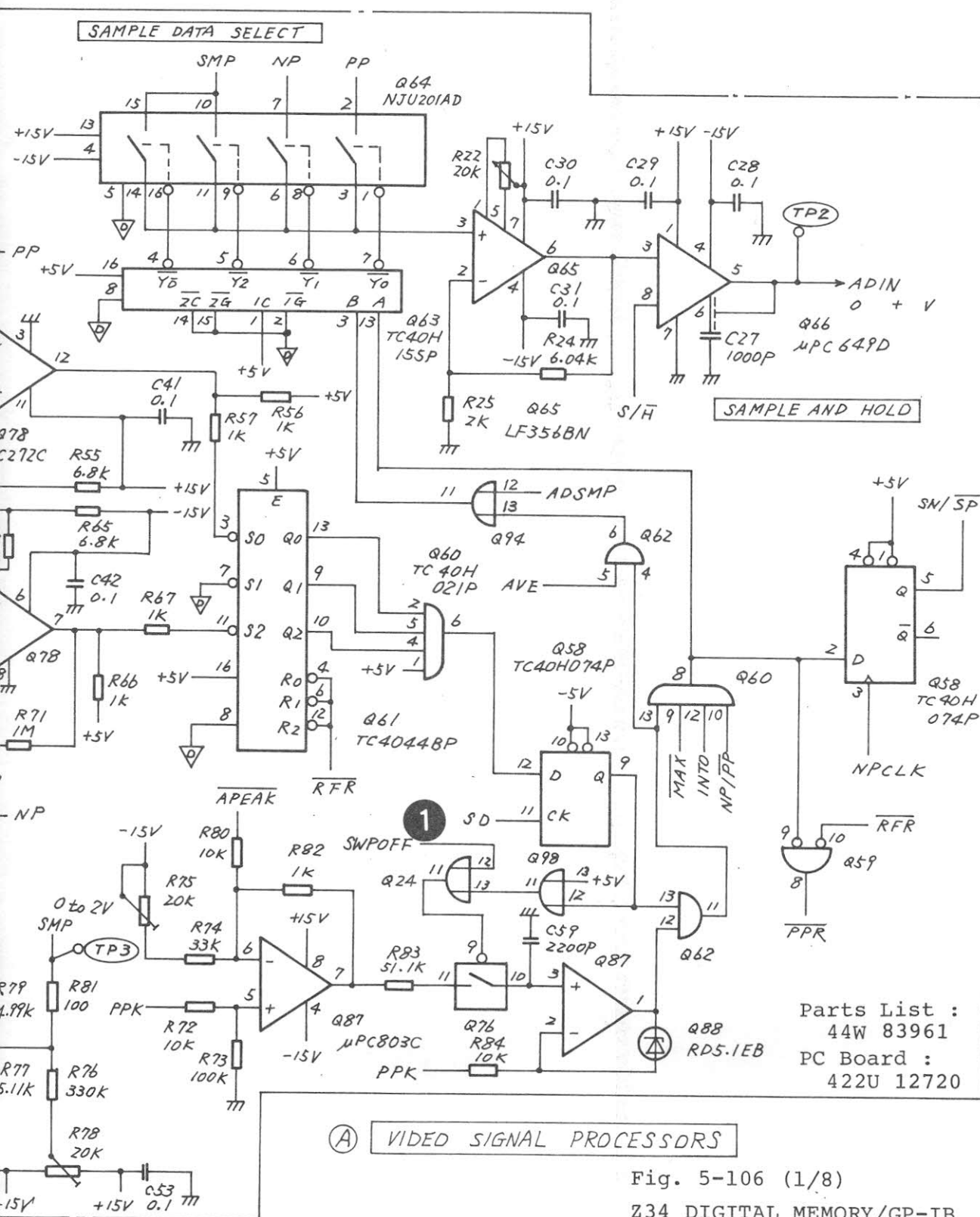
Fig. 5-105 ATT/SW DRIVER

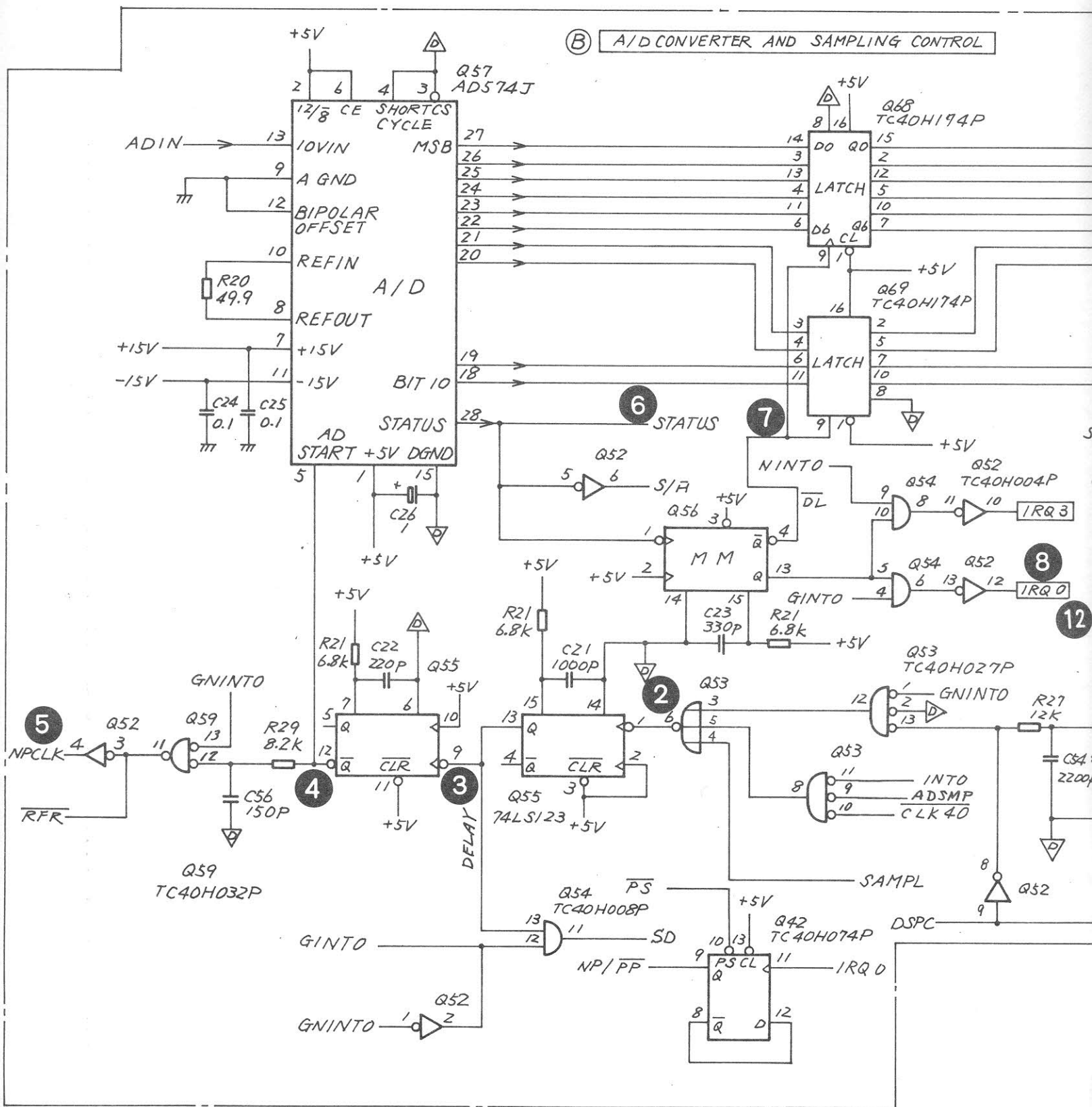












(B) A/D CONVERTER AND SAMPLING CONTROL

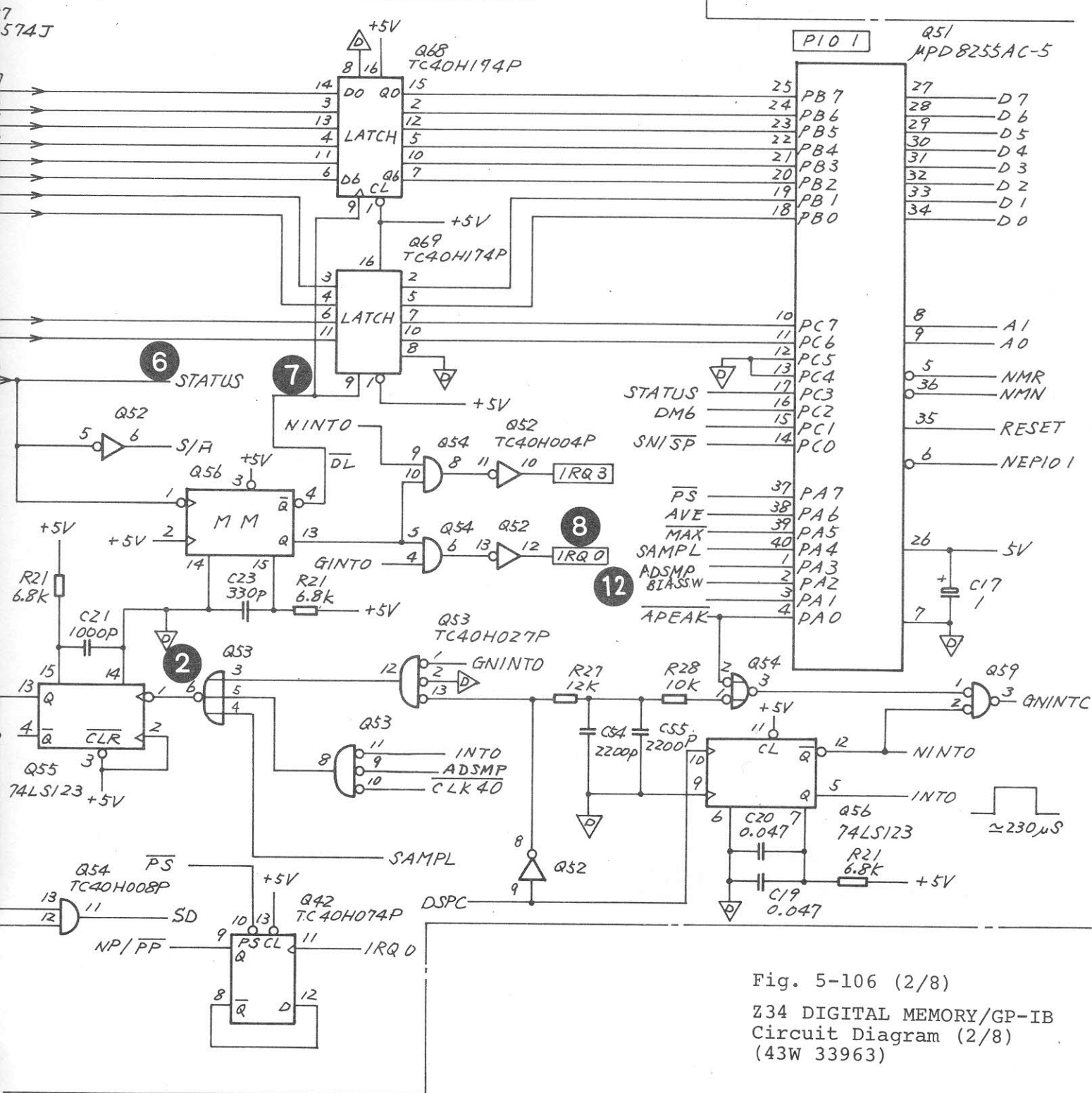
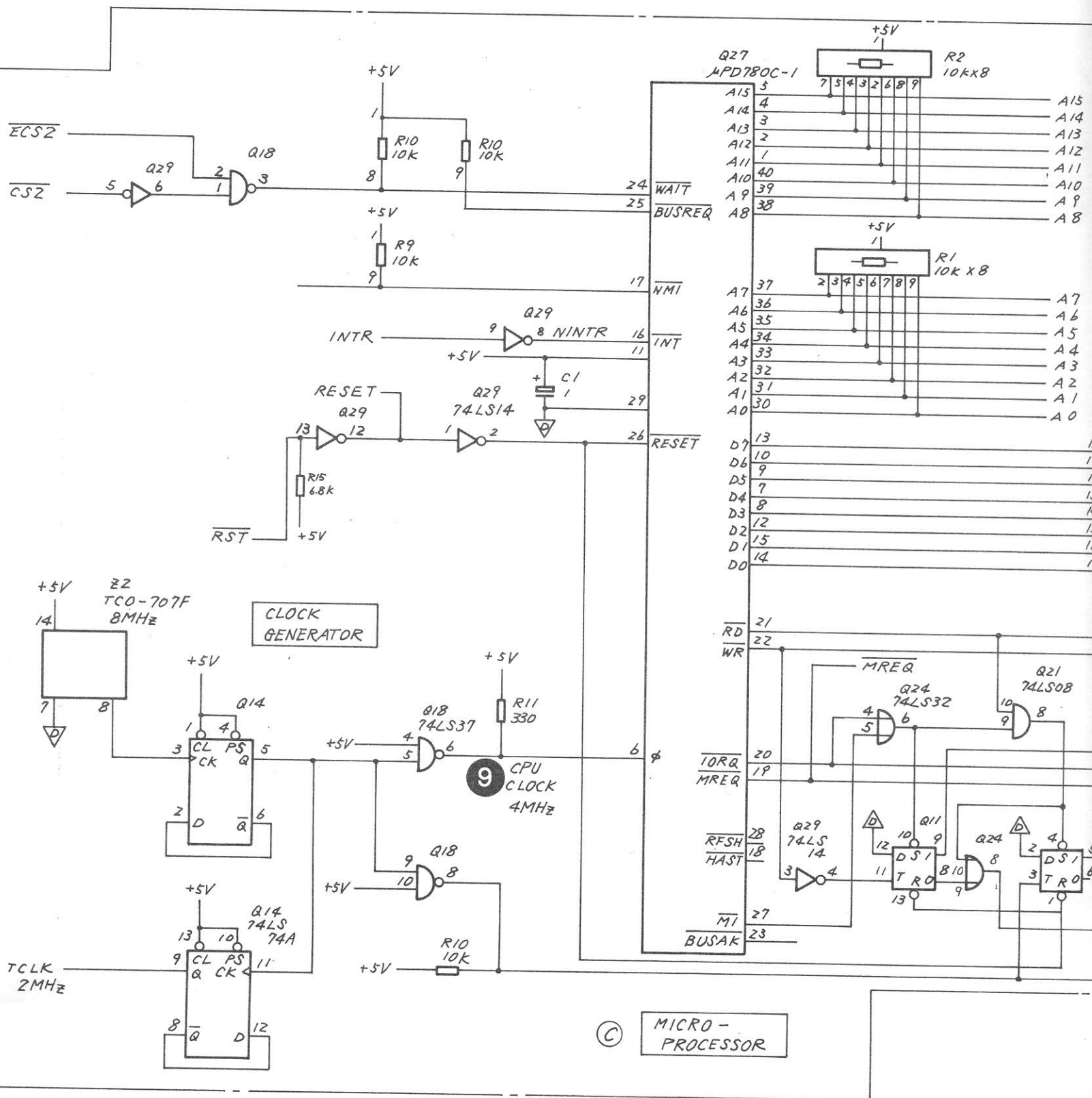


Fig. 5-106 (2/8)

Z34 DIGITAL MEMORY/GP-IB  
Circuit Diagram (2/8)  
(43W 33963)



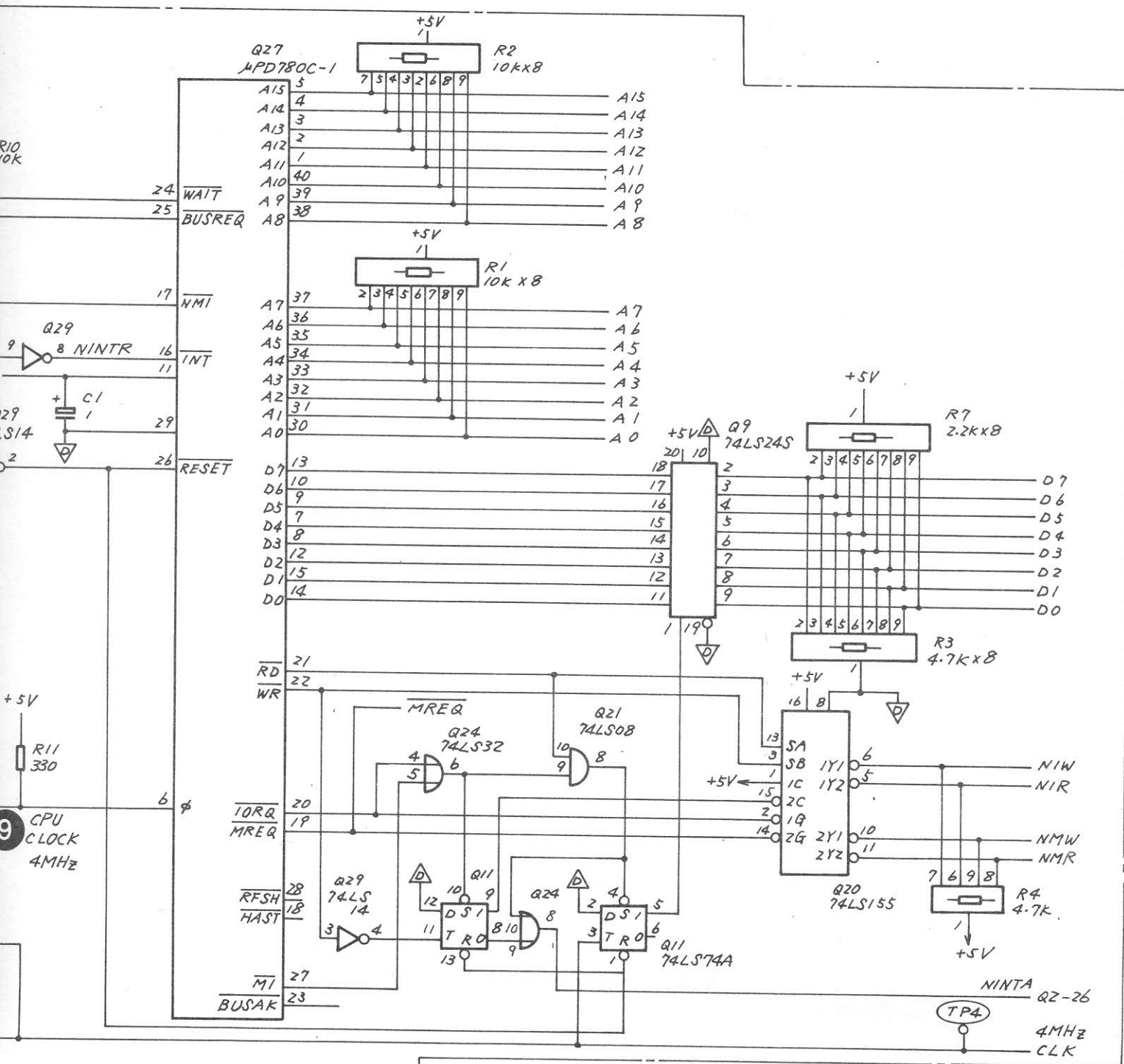
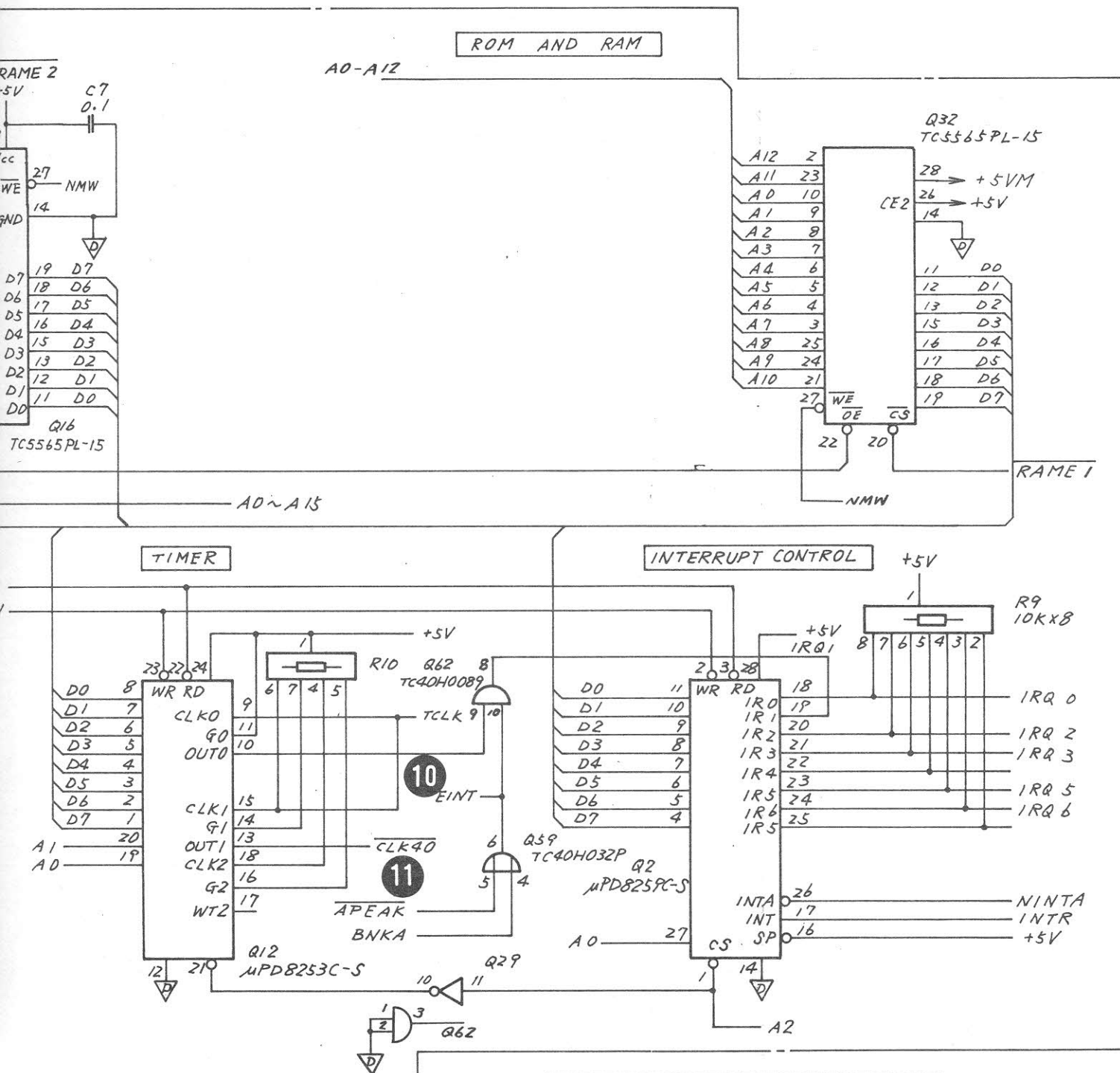


Fig. 5-106 (3/8)

Z34 DIGITAL MEMORY/GP-IB  
Circuit Diagram (3/8)  
(43W 33963)







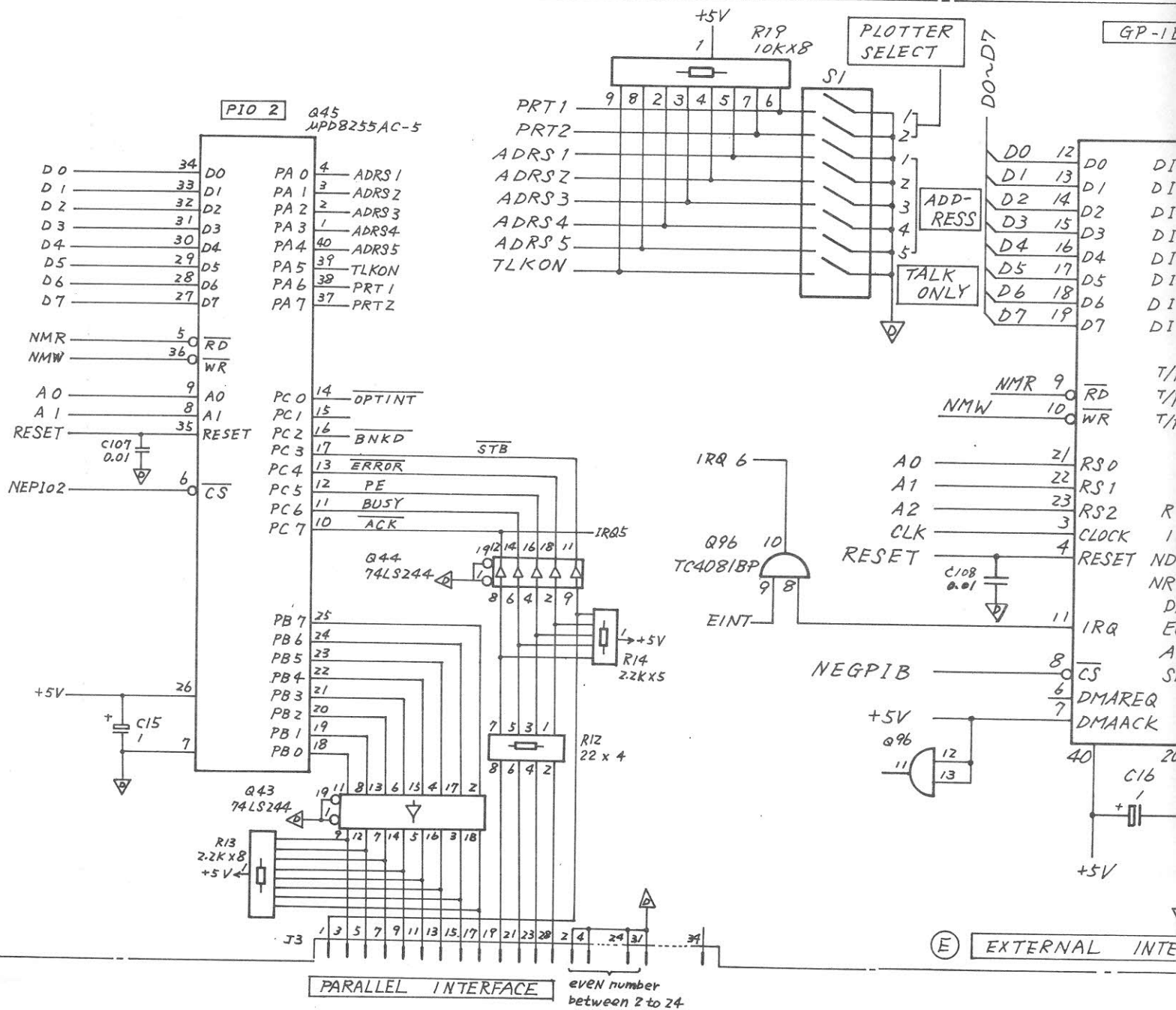
④ PERIPHERAL CIRCUIT FOR CPU

Fig. 5-106 (4/8)

Z34 DIGITAL MEMORY/GP-IB  
Circuit Diagram (4/8)  
(43W 33963)

5-301/(5-302 blank)

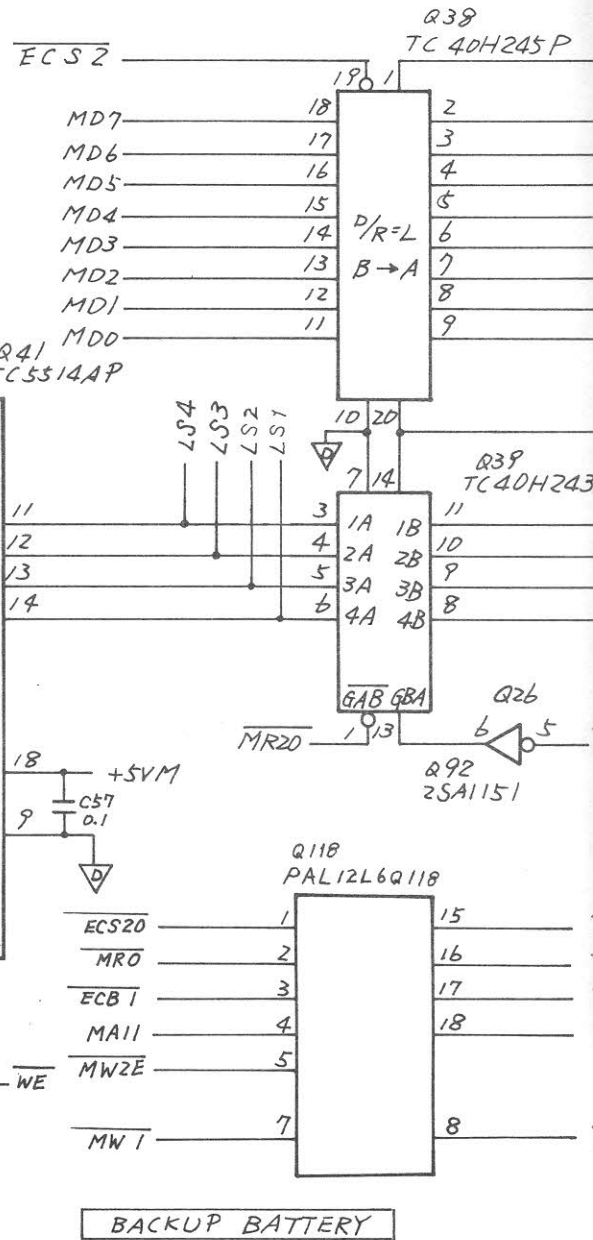
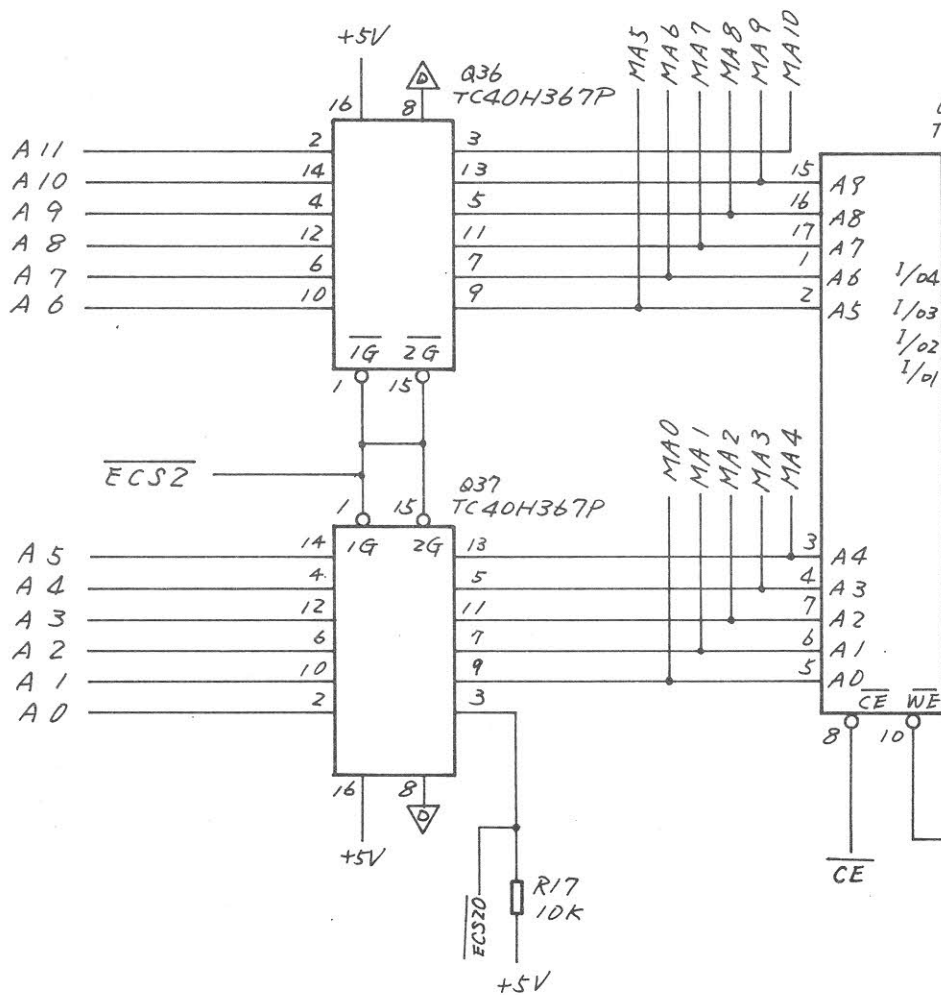






⑦ LS 2 bit MEMORY FOR TRACE DATA

DISPLAY RAM CONTROL



DATA

TROL

MA0  
MA1  
MA2  
MA3  
MA4  
MA5  
MA6  
MA7  
MA8  
MA9  
MA10

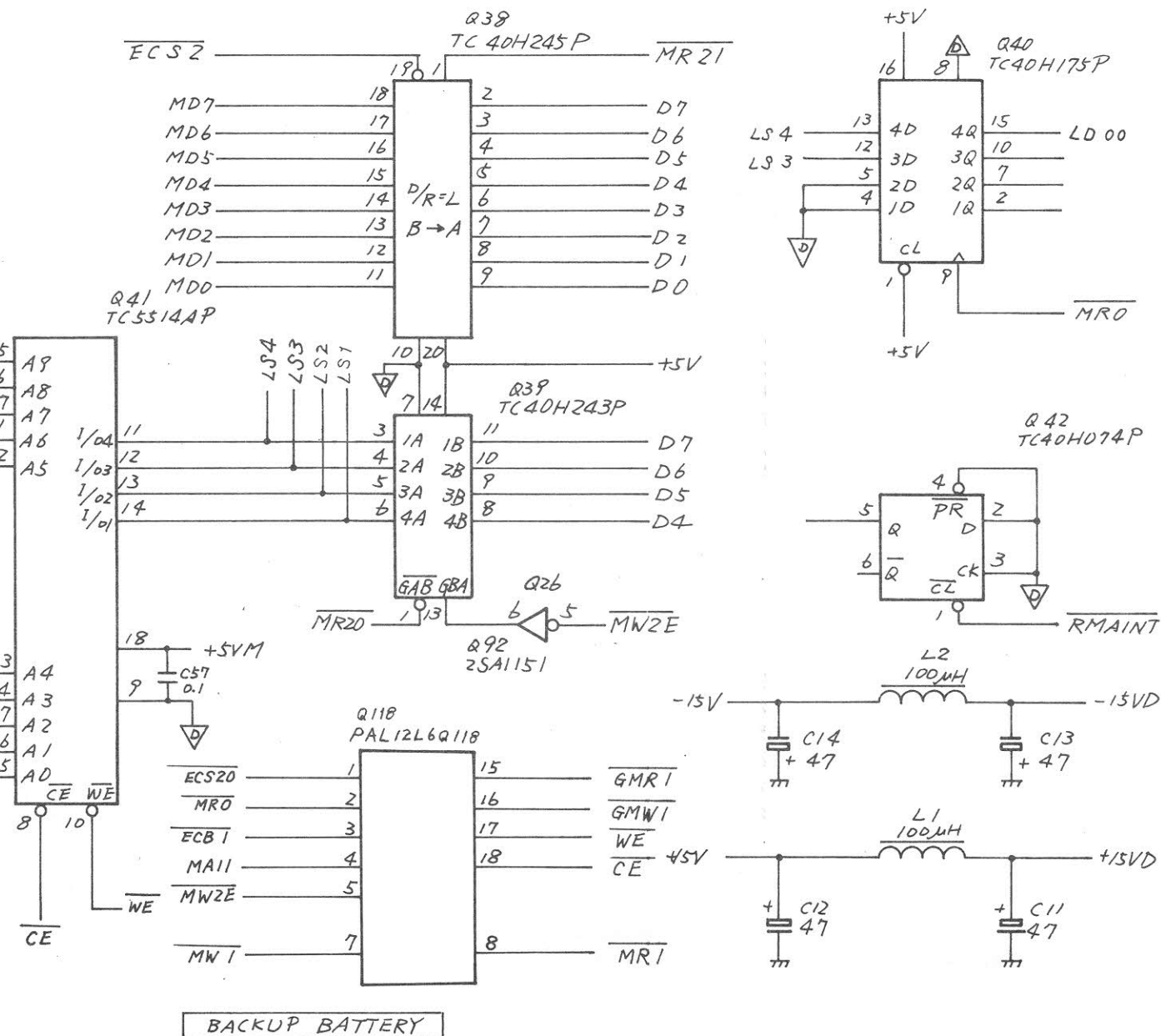
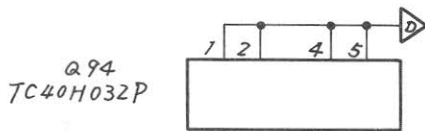


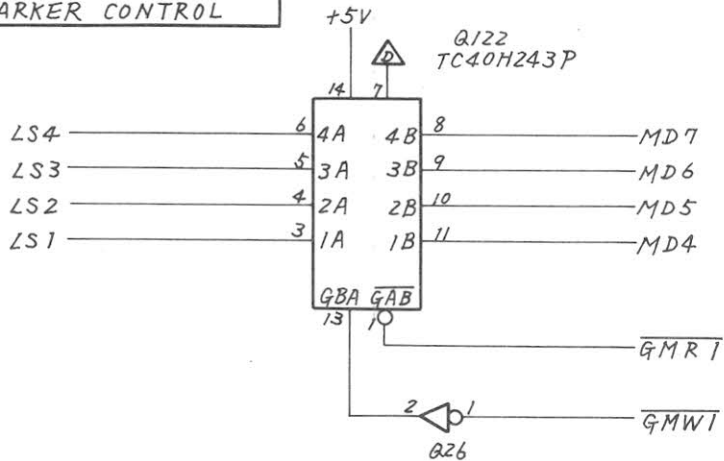
Fig. 5-106 (6/8)

Z34 DIGITAL MEMORY/GP-IB  
Circuit Diagram (6/8)  
(43W 33963)

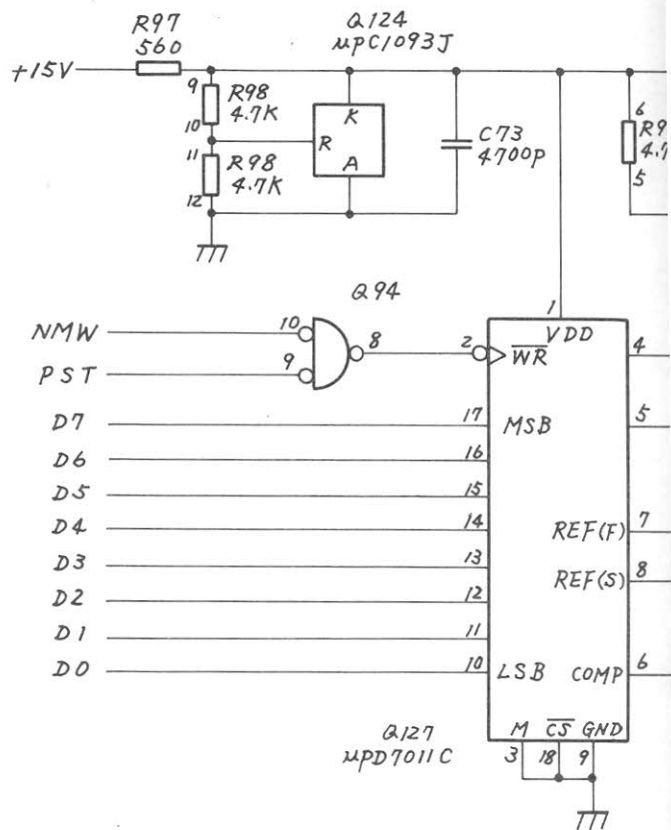
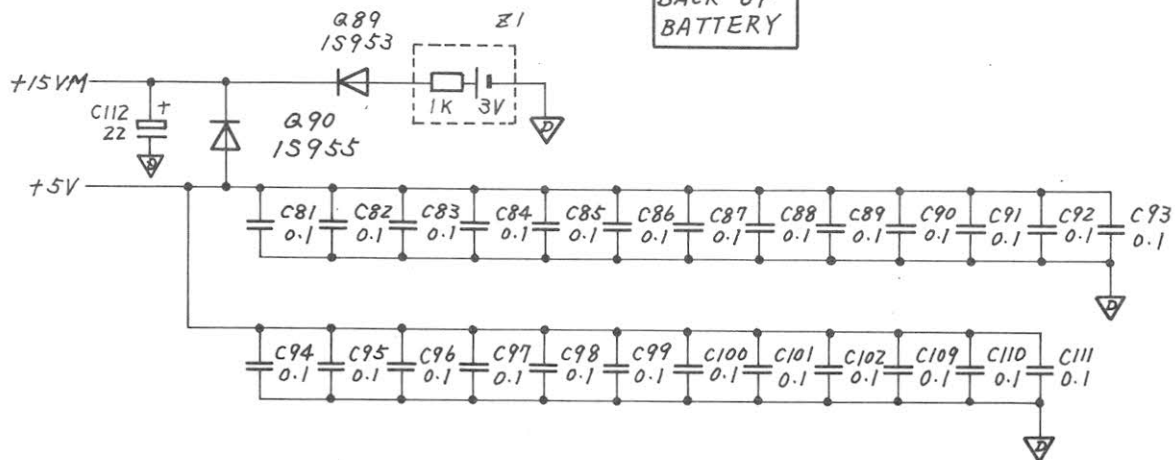
5-305/(5-306 blank)



MARKER CONTROL



BACK UP  
BATTERY



(J5-7) BIAS

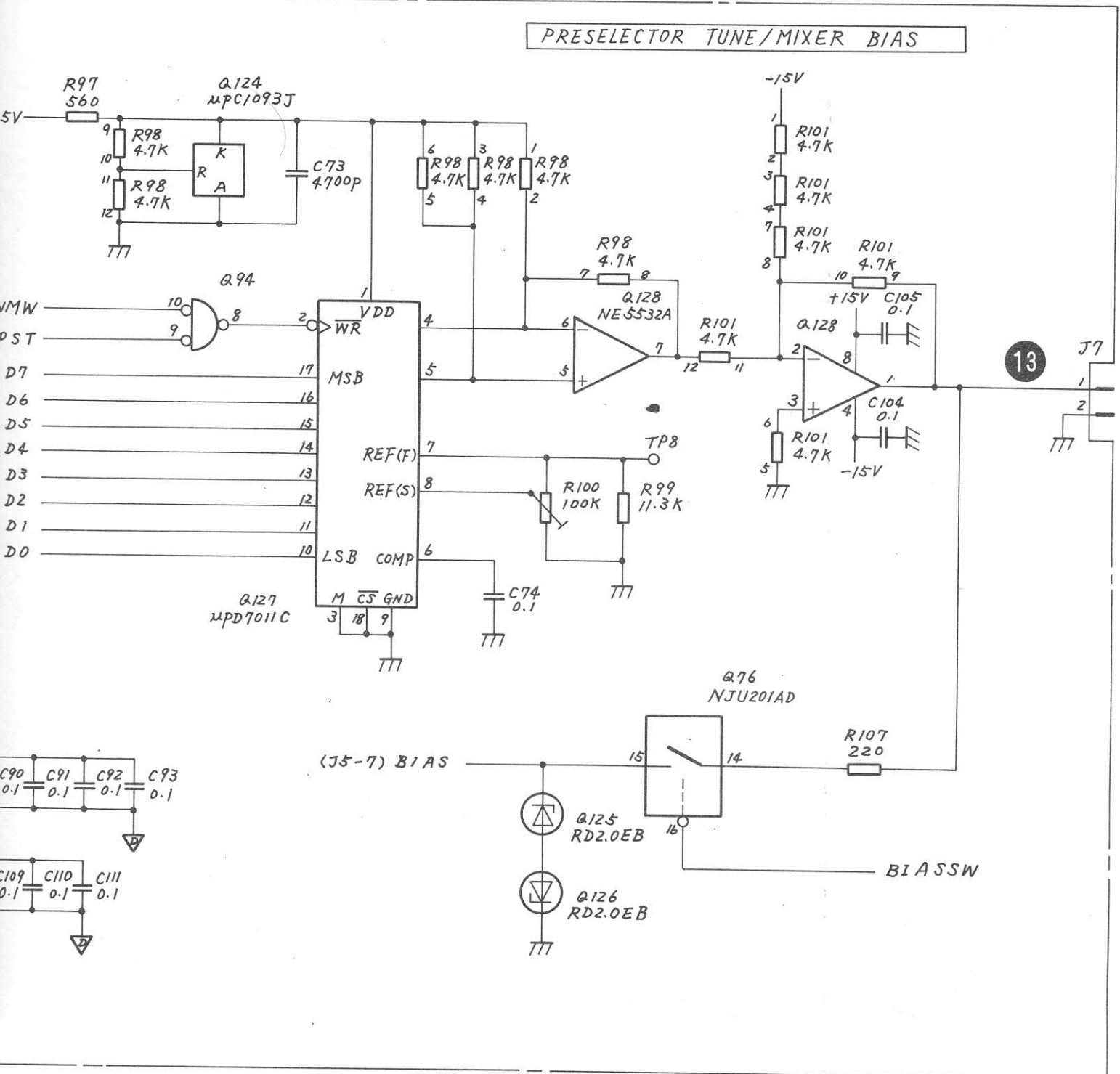
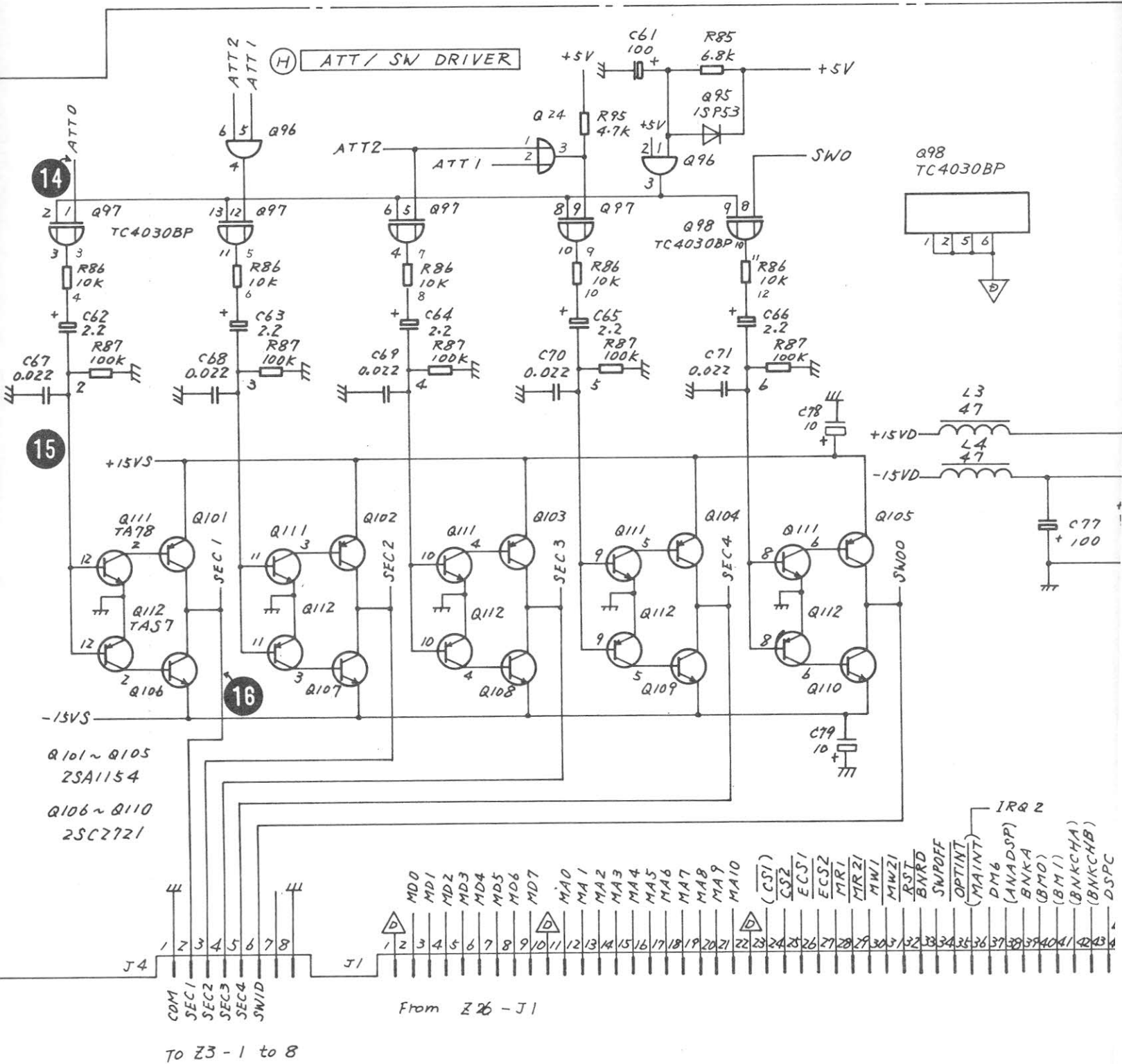


Fig. 5-106 (7/8)

Z34 DIGITAL MEMORY/GP-IB  
Circuit Diagram (7/8)  
(43W 33963 M-2)

5-307/(5-308 blank)



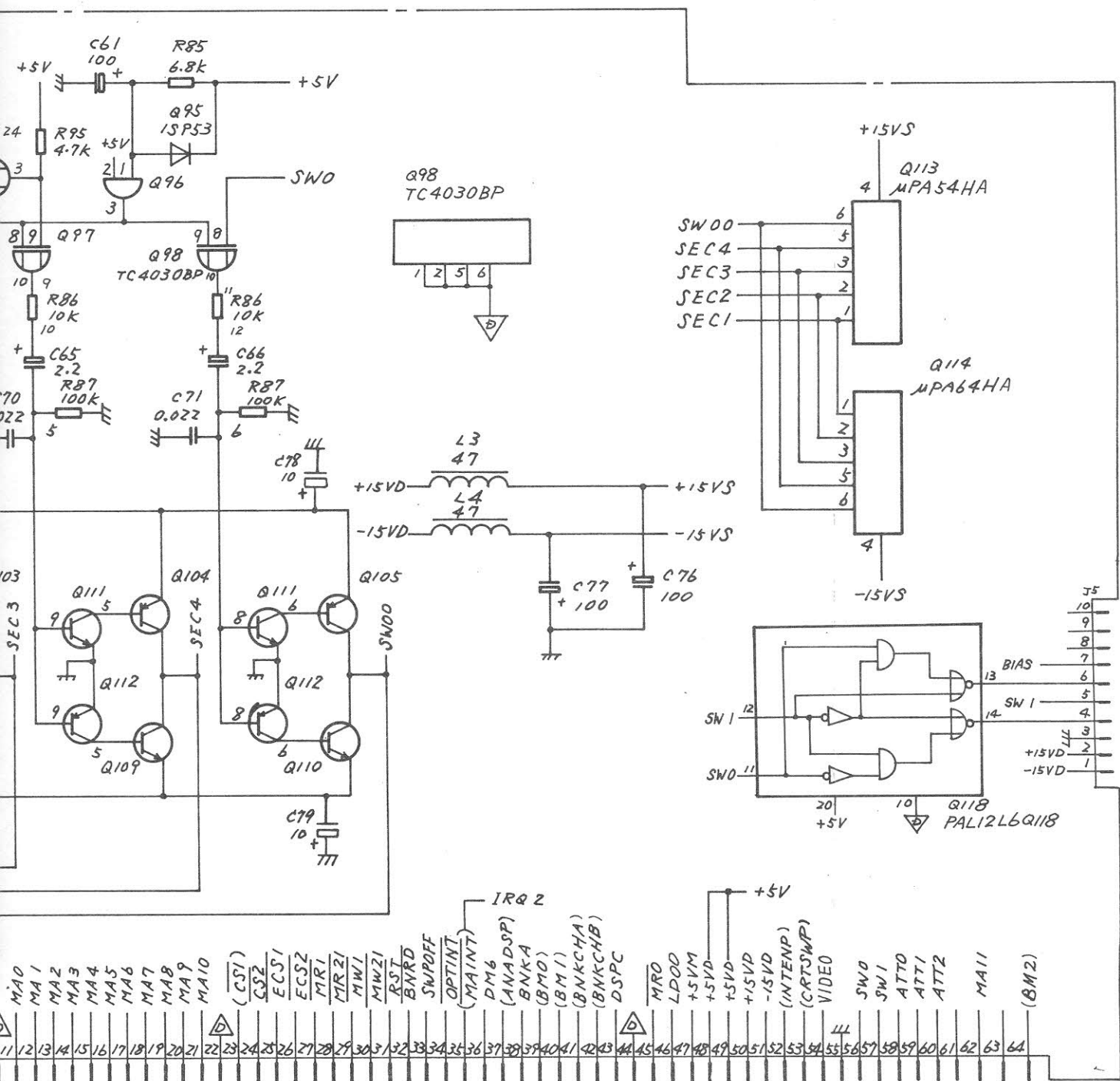


Fig. 5-106 (8/8)

Z34 DIGITAL MEMORY/GP-IB  
Circuit Diagram (8/8)  
(43W 33963)

5-309/(5-310 blank)



## 5.21 Z35 Low 1st MIX (MS710C only)

### 5.21.1 Circuit description - Z35

(Refer to Fig. 5-108)

This circuit converts a 10 kHz to 30 MHz band input signal into a 521.4 MHz IF signal.

This 10 kHz to 30 MHz input signal supplied at J1 is sent to mixer Z1 through LPF L1 and L2. It is then mixed with the 521.4 to 551.4 MHz local signal for conversion into a 521.4 MHz IF signal. The 521.4 MHz IF signal is sent to the Z36 EXT IF AMP through J4.

The 521.4 to 551.4 MHz local signal supplied at J3 is amplified by Q6, and sent to mixer Z1.

### 5.21.2 Checking procedure - Z35

Before checking the Z35 operation, confirm that Z36 is operating normally.

Step	Procedure
1	Remove the MS710[ ] bottom cover according to Fig. 2-1.
2	Set the MS710[ ] as follows: <ul style="list-style-type: none"><li>. Frequency band: 10 kHz to 30 MHz</li><li>. Center frequency: 15 MHz</li><li>. FREQ SPAN/DIV: 0 Hz/div</li><li>. Reference level: -10 dBm</li><li>. INPUT ATTEN: 20 dB</li></ul>
3	Apply a 15 MHz, -10 dBm signal to the MS710[ ] RF INPUT connector.  Z35 operation is normal when the Z36-J5 output is 521.4 MHz, -36 dBm.

### 5.21.3 Adjustment - Z35

Step	Procedure
1	Set the MS710C as follows: <ul style="list-style-type: none"> <li>. Frequency band: 10 kHz to 30 MHz</li> <li>. Center frequency: 15 MHz</li> <li>. FREQ SPAN/DIV: 1 MHz/div</li> <li>. RES BW: 100 kHz</li> <li>. Reference level: -10 dBm</li> </ul>
2	Apply a 15 MHz, -10 dBm signal to the MS710C RF INPUT connector.
3	Adjust Z35-R13 to set the signal to the uppermost scale line on the MS710C CRT.

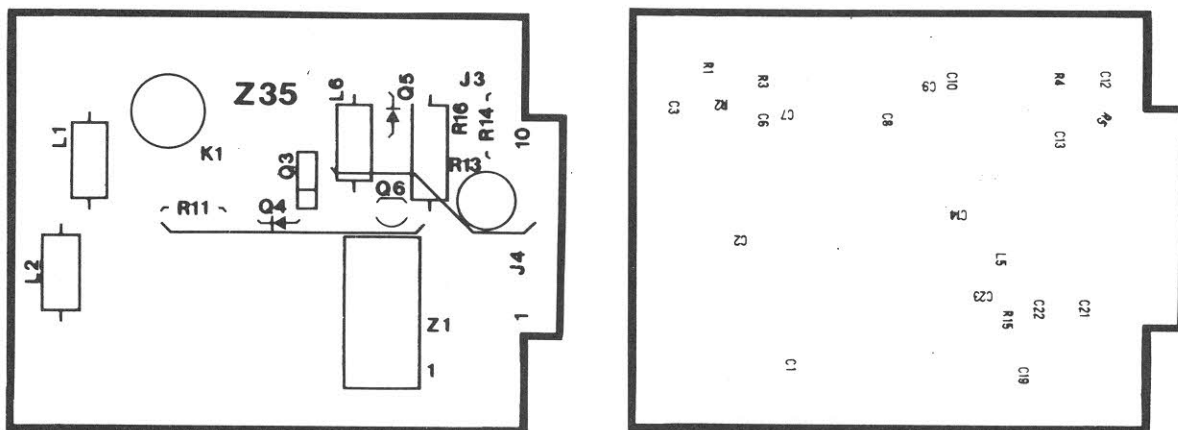
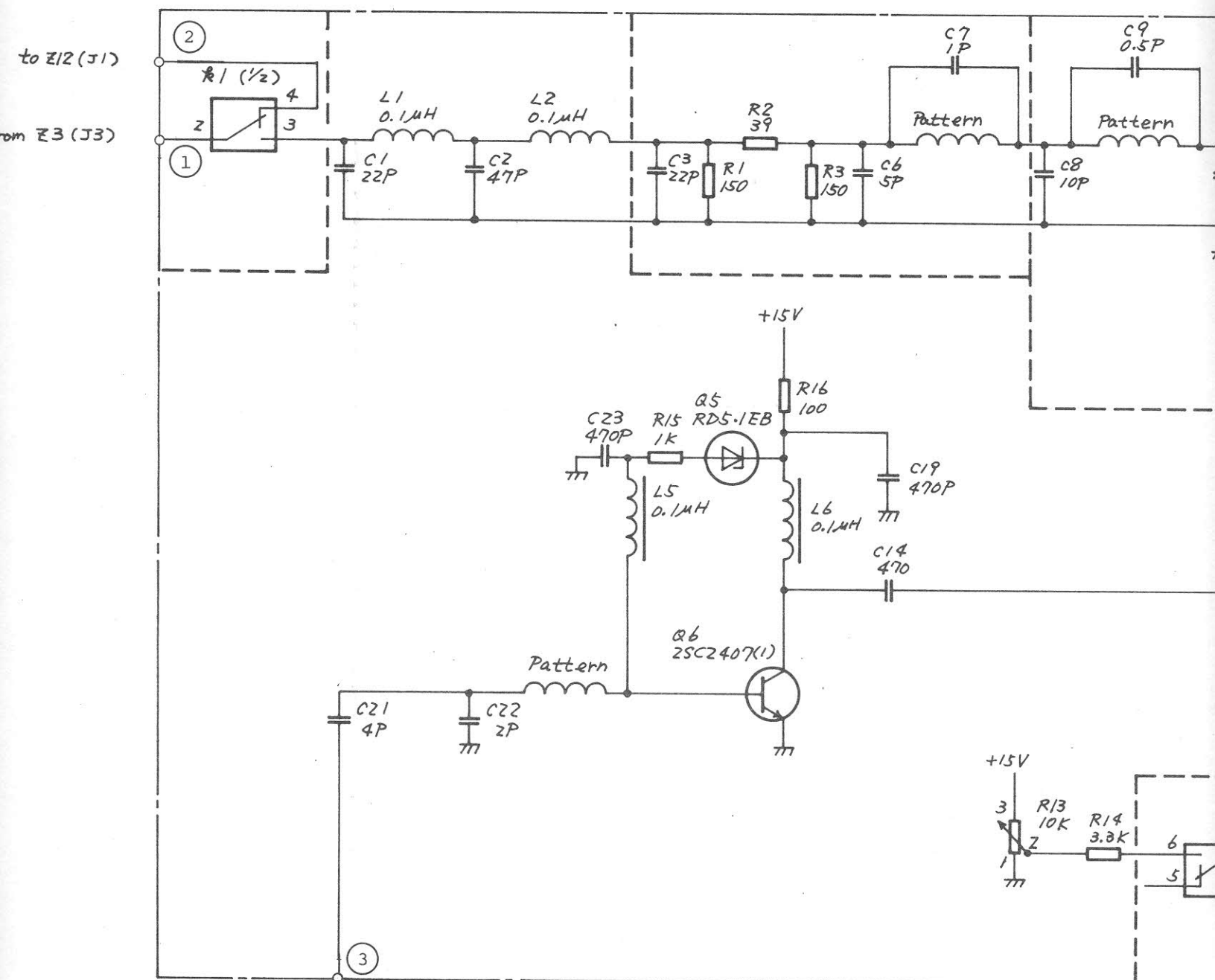


Fig. 5-107 Z35 Parts Layout



from Z28 (J94)

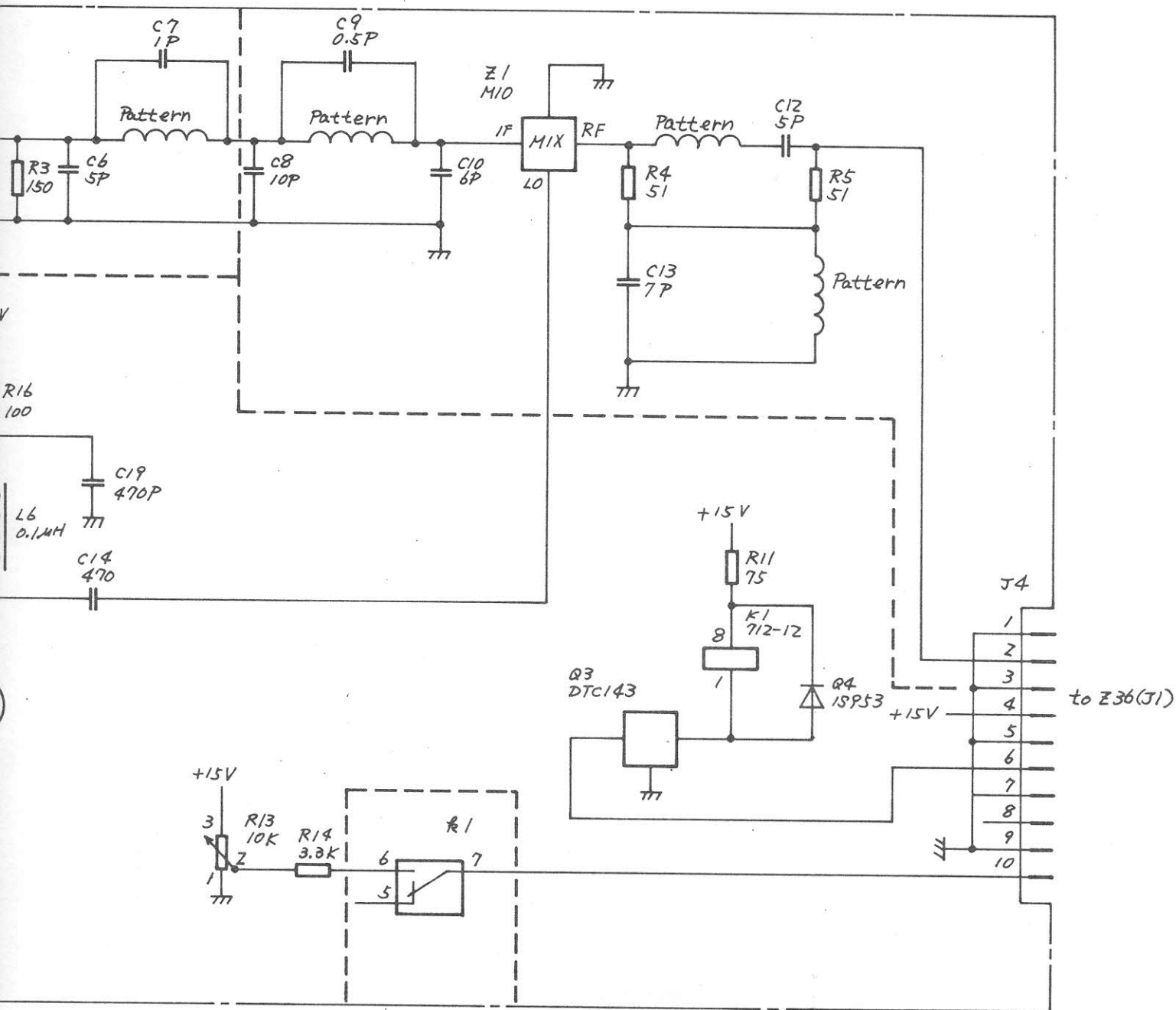


Fig. 5-108 Z35 LOW 1st MIX  
Circuit Diagram (43W33964)

5-313/(5-314 blank)

## 5.22 Z36 EXT IF AMP (MS710C/D only)

### 5.22.1 Circuit description - Z36

(Refer to Fig. 5-110)

This circuit receives, amplifies, and sends the 521.4 MHz IF signal from the external mixer to the Z18  $\mu$  2nd converter 1 when the MS710C/D is operated with the external mixer.

The 521.4 MHz IF signal is input through ⑫ when the two-port mixer is used and through ⑪ when the three-port mixer is used.

Relay K2 selects 10 kHz to 30 MHz and external mixer bands.

The 521.4 MHz IF signal selected by this relay is amplified by Q1 and sent from ⑭ to the Z18  $\mu$  2nd converter 1.

The 521.4 MHz IF signal of the 1.7 to 23 GHz band, which is sent from the Z6  $\mu$  1st converter, enters relay K4 through ⑬.

### 5.22.2 Checking procedure - Z36

Step	Procedure
1	Remove the MS710C/D bottom cover according to Fig. 2-1.
2	Set the MS710C/D as follows: Frequency band: EXT MIX (22 to 33 GHz, 3-port)
3	Apply a 521.4 MHz, -28 dBm signal to the MS710C/D EXTERNAL MIXER IF INPUT connector. The Z36 is normal when the output from Z36-J5 ⑭ is 521.4 MHz, -16 dBm.

### 5.22.3 Adjustment - Z36

This circuit requires no adjustment.

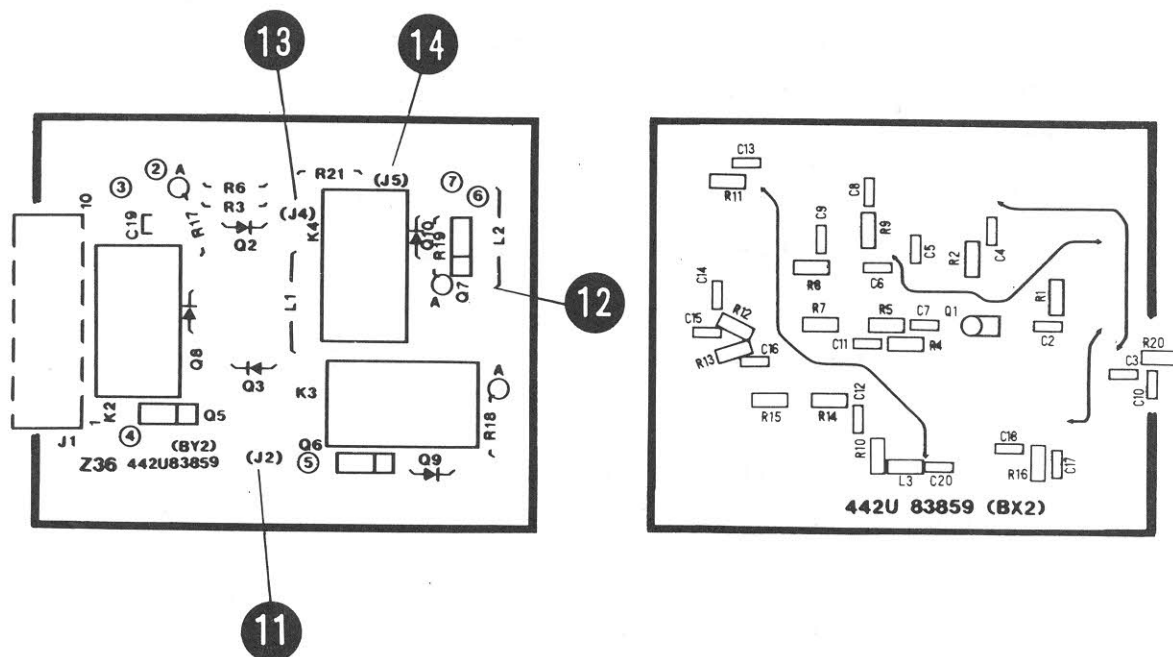


Fig. 5-109 Z36 Parts Layout







SECTION 6  
REPLACEABLE PARTS

6.1 Introduction

This section contains informations relative to ordering replacement parts.

The following table shows circuit reference (hereinafter CKT REF) and abbreviations used for parts given in the Parts List.

In the Parts List, the quantity of each part is one if no quantitative description is given in the "NOTE" column.

6.2 Ordering Information

When ordering parts, please give the following descriptions by referring to the PARTS LIST.

Item		Example
(1)	Name of instrument	Spectrum Analyzer MS710C/D/E/F
(2)	Name of part list	Parts List: SPECTRUM ANALYZER MS710[ ]
(3)	CKT REF	J 1
(4)	Name of part	HRM-556S
Note:		
Part name is given in parentheses ( ) in the Parts List. Parts with asterisks* are those that require factory adjustment upon repairing. When ordering a part or parts with asterisk, give full description of the part.		
(5)	Quantity	1
(6)	Serial No. of instrument	M31257

## (1) Circuit references

Table 6-1

AT: Attenuator	K: Relay	Q: Transistor, diode, IC, rectifier	V: Neon lamp, vacuum tube
C: Capacitor	L: Coil, microinductor	R: Resistor	X: Crystal OSC
F: Fuse	M: Meter, timer	S: Switch	Z: Unit
J: Jack, plug, connector	P: Lamp	T: Transformer	

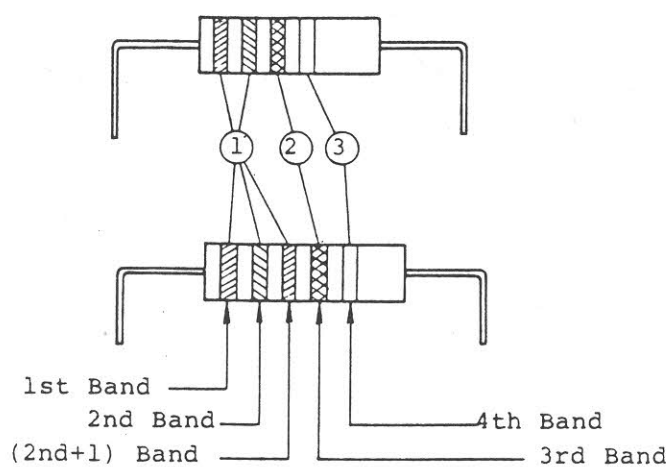
## (2) Abbreviations

Table 6-2

A: amperes	Multi: multiplying
Att, R var: variable attenuator using film elements	N-ch: N-channel
BL: boundary layer	non-lin: non-linear taper
Cer: ceramic	Non-pol: non polarity
CF: carbon film	NPN: negative-positive-negative
Comp: composition	$\Omega$ : ohms
CRT: cathode-ray tube	p: pico ( $\times 10^{-12}$ )
Di: diode	Plast: plastic film
DIP: dual in-line package	PMTR: potentiometer
Elect: electrolytic aluminum	PNP: positive-negative-positive
F: farad	p-p: peak-to-peak value
FET: field-effect transistor	RFC: RF choke
G: ground	R-lamp: resistor lamp
Ge: germanium	rms: effective value (root-mean-square)
H: henry	SBD: Schottky barrier diode
Hz: hertz	SCR: silicon-controlled rectifier
IC: integrated circuit	Si: silicon
IEC: Conforms to IEC Safety Standards.	SRD: step-recovery diode
J-FET: junction FET	Tant: tantalum
k: kilo ( $\times 10^3$ )	TM: time-lag
LED: light-emitting diode	Tr: transistor
M: mega ( $\times 10^6$ )	Trans: transformer
m: milli ( $\times 10^{-3}$ )	$\mu$ : micro ( $\times 10^{-6}$ )
MF: metallized film	V: volt
MOS-FET: metal-oxide semiconductor FET	Var: variable
M paper: metallized paper	WW: wire-wound
M plast: metallized plastic film	XTAL: crystal

## 6.3 Reading Capacitance and Resistance

### (1) Reading resistance



	①		②	③
COLOR	Figure		Multiplier	Tolerance
	1st	2nd	3rd	4th
Black	0	0	$\times 10^0$	-
Brown	1	1	$\times 10^1$	-
Red	2	2	$\times 10^2$	-
Orange	3	3	$\times 10^3$	-
Yellow	4	4	$\times 10^4$	-
Green	5	5	$\times 10^5$	$\pm 0.5\%$
Blue	6	6	$\times 10^6$	-
Purple	7	7	$\times 10^7$	-
Grey	8	8	$\times 10^8$	-
White	9	9	$\times 10^9$	-
Gold	-	-	$\times 10^{-1}$	$\pm 5\%$
Silver	-	-	$\times 10^{-2}$	$\pm 10\%$
-----	-	-		$\pm 20\%$

For Examples:

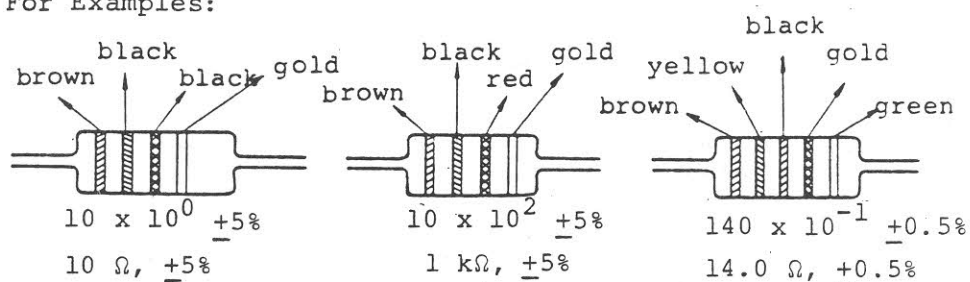


Fig. 6-1 Reading Resistance

(2) Reading capacitance

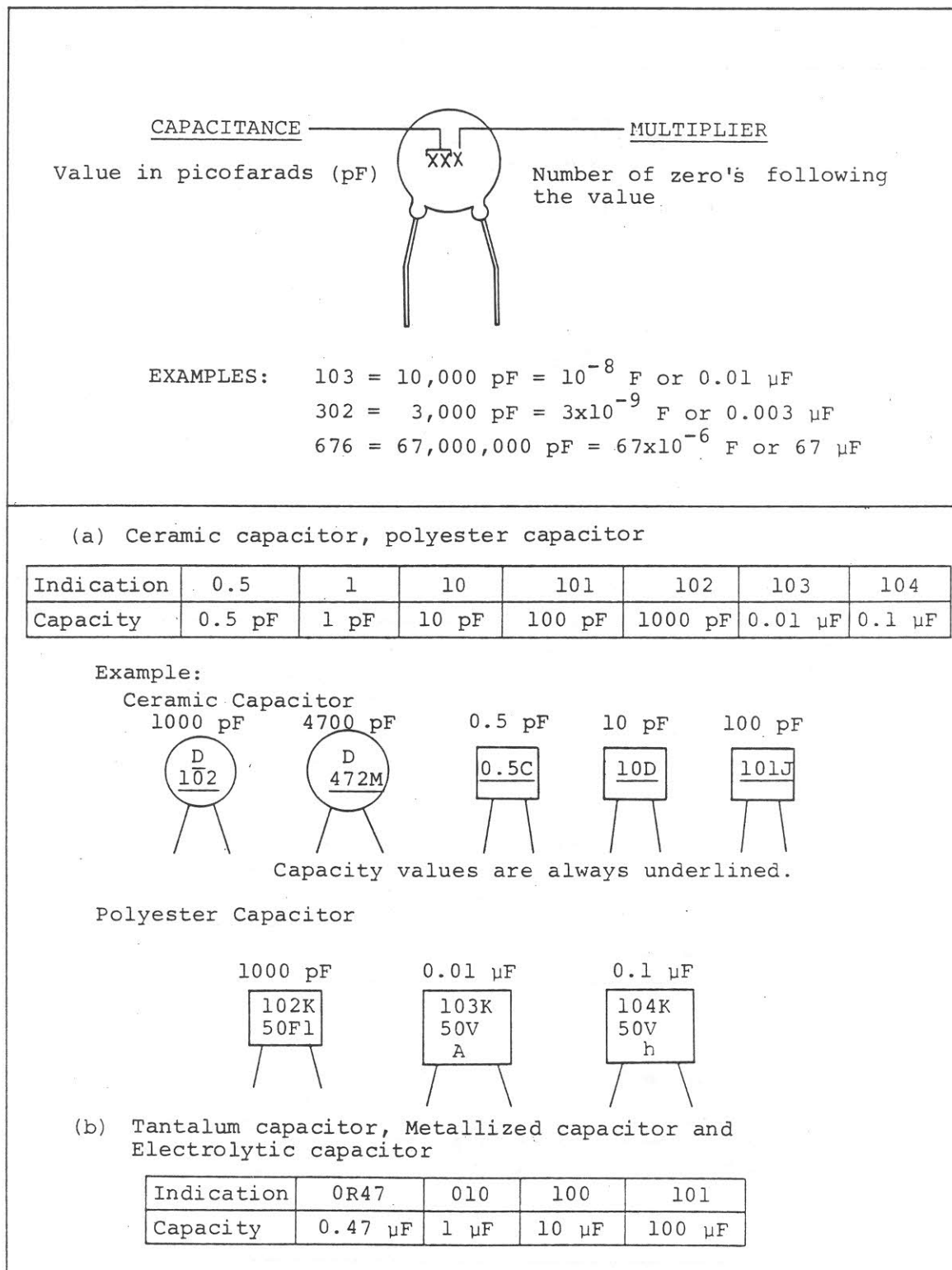


Fig. 6-2 Reading Capacitance

## 6.4 Semiconductor Markings

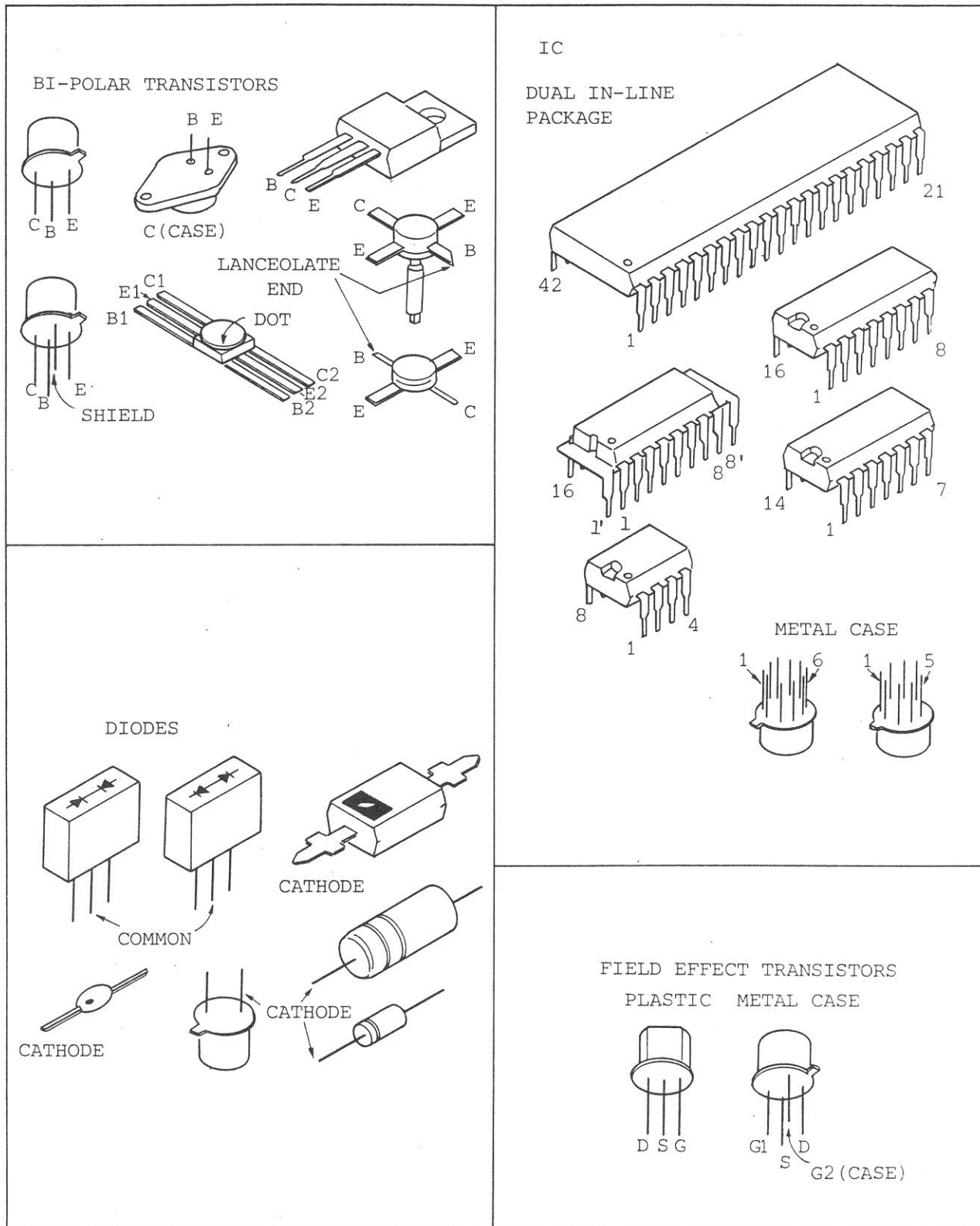


Fig. 6-3 Examples of Semiconductor Marking Methods

## 6.5 Parts List

Parts List : SPECTRUM ANALYZER MS710[ ]

CRT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C 2	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C 3	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C 4	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C 5	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C 6	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C
C 7	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C 8	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C 9	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C10	Not assigned		
C11	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C
C12	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C13	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C14	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
C15	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	MS710C/D
F 1	Fuse, TM, (T***A250V)	100 to 127Vac ... 5A	
F 2	Fuse, TM, (T***A250V)	200 to 254Vac ... 2A	
		100 to 127Vac ... 5A	
		200 to 254Vac ... 2A	
G 1	Fan, (109S005UL)		
J 1	Connector, (HRM-556S)		
J 2	Semirigid cable, (449J74143B)		MS710D/E/F
J 3	Semirigid cable, (449J74008)		MS710C/D
J 4	Connector, (27DP-LP-1.5QEW-AA)		MS710C/D
J 5	Connector, (27DP-LP-1.5QEW-AA)		
J 6	Cable, (449J74487)		
J 7	Semirigid cable, (449J84194)		
J 8	Semirigid cable, (449J84196)		
J 9	Semirigid cable, (449J84195)		
J10	Not assigned		
J11	Connector, (27DP-LP-1.5QEW-AA)		MS710C/D
J12	Connector, (27DP-LP-1.5QEW-AA)		MS710C/D

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : SPECTRUM ANALYZER MS710[ ]

CRT REF	DESCRIPTION	RATING	NOTE
J13	Semirigid cable, (439J33916)		MS710C/D
J14	Cable, (449J74488C)		
J15	Semirigid cable, (439J33921)		
J16	Semirigid cable, (439J33917)		
J17	Semirigid cable, (439J34311)		
J18	Semirigid cable, (439J33918)		MS710C/D
J19	Semirigid cable, (439J33920)		MS710C/D
	Semirigid cable, (439J86184)		MS710E/F
J20	Plug, (PI011-10F)		
J21	Plug, (PI011-05F)		
J22	Connector, (27DP-LP-1.5QEW-AA)		
J23	Connector, (27DP-LP-1.5QEW-AA)		
J24	Not assigned		
J25	Plug, (PI011-05F)		
J26	Plug, (PI011-05F)		
J27	Plug, (PI011-04F)		
J28	Plug, (PI011-04F)		
J29	Plug, (PI011-12F)		
J30	Plug, (PU011-12F)		
J31	Not assigned		
J32	Connector, (DF1-2S2.5R24)		
J33	Connector, (DF1-2S2.5R24)		
J34	Connector, (DF1-12S2.5R24)		
J35	Connector, (DF1-12S2.5R24)		
J36	Connector, (DF1-2S2.5R24)		
J37	Connector, (DF1-2S2.5R24)		
J38	Receptacle, (BNC-R-101-NI)		
J39	Receptacle, (BNC-R-101-NI)		
J40	Not assigned		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : SPECTRUM ANALYZER MS710[ ]

CRT REF	DESCRIPTION	RATING	NOTE
J41	Connector, (DF1-2S2.5R24)		
J42	Connector, (DF1-2S2.5R24)		
J43	Connector, (DF1-5S2.5R24)		
J44	Not assigned		
J45	Receptacle, (BNC-R-101-NI)		
J46	Receptacle, (BNC-R-101-NI)		
J47	Receptacle, (BNC-R-101-NI)		
J48	Plug, (PI011-10F)		
J49	Plug, (PI011-12F)		
J50	Not assigned		
J51	Cable, (44J74489A)		
J52	Connector, (44J79661)		
J53	Not assigned		
J54	Plug, (PI011-02F)		
J55	Plug, (PI011-02F)		
J56	Connector, (DF1-8S2.5R24)		
J57	Connector, (DF1-8S2.5R24)		
J58	Plug, (PI011-05F)		
J59	Plug, (PI011-05F)		
J60	Plug, (PI011-02F)		
J61	Plug, (PI011-08F)		
J62	Plug, (PI011-07F)		
J63	Not assigned		
J64	Connector, (57FE36-HIF3A34)		
J65	Connector, (U-SB1503)		
J66	Inlet, (8843-2SPFL4/364)		
J67	Terminal, (A-12)		
J68	Connector, (RA0304NAG)		
J69	Connector, (DF1-5S2.5R24)		
J70	Not assigned		
J71	Socket, (CRT 14 pins)		
J72	Not assigned		
J73	Semirigid cable, (449J84107)		MS710C

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : SPECTRUM ANALYZER MS710[ ]

CRT REF	DESCRIPTION	RATING	NOTE
J74	Semirigid cable, (449J84198)		MS710C
J75	Connector, (27DP-LP-1.5QEW-AA)		MS710C
J76	Connector, (27DP-LP-1.5QEW-AA)		MS710C
J77	Connector, (27DP-LP-1.5QEW-AA)		MS710C
J78	Connector, (27DP-LP-1.5QEW-AA)		MS710C
J79	Connector, (DF1-8S2.5R24)		MS710C
J80	Connector, (DF1-10S2.5R24)		MS710C/D
J81	Connector, (27DP-LP-1.5QEW-AA)		MS710C/E
J82	Connector, (27DP-LP-1.5QEW-AA)		MS710C/E
J83	Plug, (PI011-02F)		MS710C/E
J84	Plug, (PI011-02F)		MS710C/E
J85	Connector, (27DP-LP-1.5QEW-AA)		MS710C
J86	Connector, (27DP-LP-1.5QEW-AA)		MS710C
J87	Connector, (27DP-LP-1.5QEW-AA)		MS710C
J88	Connector, (27DP-LP-1.5QEW-AA)		MS710C
J89	Connector, (DF1-5S2.5R24)		MS710C
J90	Not assigned		
J91	Connector, (27DP-BJ-1.5)		MS710C
J92	Connector, (27DP-BR)		MS710C
J93	Connector, (27DP-BR)		MS710C
J94	Connector, (27DP-BR)		MS710C
J95	Connector, (27DP-BR)		MS710C
J96	Connector, (27DP-BR)		MS710C
J97	Connector, (2052-1659-02)		MS710C
J98	Connector, (2052-1659-02)		MS710C
J99	Not assigned		
J100	Not assigned		
J101	Connector, (DF1-2S2.5R24)		
J102	Connector, (DF1-2S2.5R24)		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : SPECTRUM ANALYZER MS7101

CRT REF	DESCRIPTION	RATING	NOTE
J103	Connector, (C924C-5824)		
J104	Connector, (C924C-5824)		
J105	Connector, (DPI-282, 5824)		
J106	Semirigid cable, (449084733)		MS710C/D
J107	Connector, (27DP-BR)		MS710C/D
J108	Connector, (27DP-BR)		
J109	Connector, (HRM-208B)		
P 1	Lamp, (BNS-3RU-C)		
R 1	Not assigned		
R 2	Not assigned		
R 3	CF, (ARD25T105J)	1M $\Omega$ , ±5%, 1/4W	
S 1	Toggle, (FSR-9954TS)		
S 2	Slide, (ESD-3994S)		
S 3	Slide, (ESD-3994S)		
T 1	Trans, (44TS5035)		
V 1	CRT, (150CKB39)		
Z 1	FRONT PANEL I		
Z 2	FRONT PANEL II		
Z 3	RF ATT		
Z 4	Not assigned		
Z 5	IFT		
Z 6	1st CONVERTER		MS710C/D
Z 7	COUPLER		MS710C/D
Z 8	DIPLEXER		
Z 9	YTO		
Z 10	YTO/TTF DRIVER		
Z 11	Not assigned		
Z 12	2 GHz LPF		
Z 13	Not assigned		
Z 14	0 to 2 GHz RF BLOCK		
Z 15	Not assigned		

( ) : Manufacturer's part number  
\* : Selected at factory

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Parts List : SPECTRUM ANALYZER MS7101

CRT REF	DESCRIPTION	RATING	NOTE
Z16	PLL BLOCK		
Z17	Not assigned		
Z18	2nd CONVERTER 1		
Z19	2nd CONVERTER 2		
Z20	Not assigned		
Z21	LOCAL CONTROL 1		
Z22	IF BPF/AMP 1		
Z23	IF BPF/AMP 2		
Z24	LOCAL CONTROL 2		
Z25	LOG LIN AMP DETECTOR		MS710C/E
Z26	CPU BOARD		
Z27	DISPLAY CONTROL		
Z28	LOW LOCAL 1		MS710C
Z29	LOW LOCAL 2		MS710C
Z30	CRT BIAS/X-Y AMP		
Z31	Not assigned		
Z32	SWITCHING REGULATOR		
Z33	CONNECTION BOARD		
Z34	DIGITAL MEMORY/GP-1B		
Z35	LOW 1st MIX		MS710C
Z36	EXT IF AMP		
Z37	Not assigned		MS710C/D
Z38	Not assigned		
Z39	Not assigned		
Z40	Not assigned		
Z41	Not assigned		
Z42	Not assigned		
Z43	Not assigned		
Z44	Not assigned		
Z45	NOISE FILTER, (ZMB2203-13)		
Z46	DUMMY LOAD, (HRM-603)		
Z47	DUMMY LOAD, (HRM-603)		
Z48	DUMMY LOAD, (HRM-601D)		MS710C/D

( ) : Manufacturer's part number  
\* : Selected at factory

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Parts List : 21 FRONT PANEL I

CRT REF	DESCRIPTION	RATING	NOTE
C 1	Elect, (C924C-1C-1R000-R53)	1.0 $\mu$ F, ±20%, 16V	
C 2	Cap, (C924C-1C-1R000-R53)	1000pF, ±20%, 50V	
C 3	Elect, (CE04M1E70)	47 $\mu$ F, ±20%, 25V	
C 4	Elect, (CE04M1E70)	47 $\mu$ F, ±20%, 25V	
C 5	Elect, (CE04M1E70)	47 $\mu$ F, ±20%, 25V	
C 6	Elect, (CE04M1E70)	47 $\mu$ F, ±20%, 25V	
C 7	Elect, (CE04M1E70)	47 $\mu$ F, ±20%, 25V	
C 8	Elect, (CE04M1E70)	47 $\mu$ F, ±20%, 25V	
C 9	Elect, (CE04M1E70)	47 $\mu$ F, ±20%, 25V	
C10	Elect, (CE04M1A101)	100 $\mu$ F, ±20%, 10V	
C11	Elect, (CE04M1A101)	100 $\mu$ F, ±20%, 10V	
J 1	Connector, (U-PA1019)		
J 2	Connector, (DP-3A508)		
J 3	Connector, (PI011-02M)		
L 1	Coil, (LF8-470K)	47 $\mu$ H	
L 2	Coil, (LF8-221K)	220 $\mu$ H	
L 3	Coil, (LF8-221K)	220 $\mu$ H	
O 1	IC, (UIC78L05)		
O 2	Not assigned		
O 3	IC, (UIC78L05)		
O 4	IC, (UIC78L05)		
O 5	IC, (UIC78L05)		
O 6	IC, (UIC78L05)		
O 7	IC, (UIC78L05)		
O 8	IC, (UIC78L05)		
O 9	Not assigned		
O10	IC, (UIC78L05)		
O11	IC, (UIC78L05)		
O12	IC, (UIC78L05)		
O13	IC, (UIC78L05)		
O14	IC, (UIC78L05)		
O15	Not assigned		
O16	Not assigned		
O17	Not assigned		
O18	LED, (TLG226)		
O19	LED, (TLG226)		
O20	LED, (TLG226)		

( ) : Manufacturer's part number  
\* : Selected at factory

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Parts List : 21 FRONT PANEL I

CRT REF	DESCRIPTION	RATING	NOTE
O21	Not assigned		
O22	LED, (TLG226)		
O23	LED, (TLG226)		
O24	LED, (TLG226)		
O25	LED, (TLG226)		
O26	Not assigned		
O27	LED, (TLG226)		
O28	Not assigned		
O29	D1, Breakdown, (RD3-9EB)	3.7 to 4.1V, 400mA	
O30	D1, Breakdown, (RD3-9EB)	3.7 to 4.1V, 400mA	
O31	IC, (UIC451C)		
O32	TF, (2SC2718)		
O33	IC, (74ALS123)		
R 1	CF, (ARD25T100J)	51 $\Omega$ , ±5%, 1/4W	
R 2	Var, MF, (R2-6P 100 $\Omega$ )	100 $\Omega$ , 1/2W	
R 3	CF, (ARD25T100J)	15K $\Omega$ , ±5%, 1/4W	
R 4	CF, (ARD25T100J)	15K $\Omega$ , ±5%, 1/4W	
R 5	CF, (ARD25T100J)	330 $\Omega$ , ±5%, 1/4W	
R 6	Not assigned		
R 7	Single in-line array, (IHR-8-103JA)	10K $\Omega$ x 8, 1/8W	
R 8	Dual in-line array, (IHR-8-103JA)	1.5K $\Omega$ x 7, 1/8W	
R 9	Not assigned		
R10	CF, (ARD25T100J)	10 $\Omega$ , ±5%, 1/4W	
R11	CF, (ARD25T100J)	10 $\Omega$ , ±5%, 1/4W	
R12	CF, (ARD25T100J)	10 $\Omega$ , ±5%, 1/4W	
R13	CF, (ARD25T100J)	10 $\Omega$ , ±5%, 1/4W	
R14	CF, (ARD25T100J)	10 $\Omega$ , ±5%, 1/4W	
R15	CF, (ARD25T100J)	10 $\Omega$ , ±5%, 1/4W	
R16	CF, (ARD25T100J)	10K $\Omega$ , ±5%, 1/4W	
R17	Var, MF, (RG16IN20SB 20K M)	20K $\Omega$ , 1/2W	
R18	Not assigned		
R19	Var, MF, (RG16IN15SB 20K M)	2K $\Omega$ , 1/2W	
R20	CF, (ARD25T100J)	120 $\Omega$ , ±5%, 1/4W	
R21	Not assigned		
R22	CF, (ARD25T100J)	680 $\Omega$ , ±5%, 1/4W	
R23	CF, (ARD25T100J)	330 $\Omega$ , ±5%, 1/4W	
R24	CF, (ARD25T100J)	3.3K $\Omega$ , ±5%, 1/4W	
R25	CF, (ARD25T100J)	3.3K $\Omega$ , ±5%, 1/4W	

( ) : Manufacturer's part number  
\* : Selected at factory

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Parts List : Z1 FRONT PANEL I

CKT REF	DESCRIPTION	RATING	NOTE
R26	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W	
R27	Not assigned		
R28	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W	
R29	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R30	Not assigned		
R31	CF, (ARD25T150J)	15 $\Omega$ , $\pm 5\%$ , 1/4W	
R32	CF, (ARD25T150J)	15 $\Omega$ , $\pm 5\%$ , 1/4W	
R33	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
S 1	Switch, (MM9-1)		
S31	Switch, (HL20-LSAB)		
S32	Switch, (HL20-LSAB)		
S33	Switch, (HL20-LSAB)		
S34	Switch, (HL20-LSAB)		
S35	Switch, (HL20-LSAB)		
S36	Switch, (HL20-LSAB)		
S37	Switch, (HL20-NS)		
S38	Switch, (HL20-NS)		
S39	Switch, (HL20-NS)		
S40	Switch, (HL20-LSAB)		
S41	Switch, (HL20-LSAB)		
S42	Switch, (HL20-LSAB)		
S43	Switch, (HL20-LSAB)		
S44	Switch, (HL20-LSAB)		
S45	Switch, (HL20-LSAB)		
S46	Switch, (HL20-LSAB)		
S47	Switch, (HL20-LSAB)		
S48	Switch, (HL20-LSAB)		
S49	Switch, (HL20-NS)		
S50	Switch, (HL20-NS)		
S51	Switch, (HL20-NS)		
S52	Switch, (HL20-NS)		
S53	Switch, (HL20-NS)		
S54	Switch, (HL20-NS)		
S55	Switch, (HL20-NS)		
S56	Switch, (HL20-LSAB)		
S57	Switch, (HL20-LSAB)		
S58	Switch, (HL20-LSAB)		
S59	Switch, (HL20-LSAB)		
S60	Switch, (HL20-LSAB)		
S61	Switch, (HL20-NS)		
S62	Switch, (HL20-NS)		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z1 FRONT PANEL I

CKT REF	DESCRIPTION	RATING	NOTE
Z 1	BUZZER, (KMB-06)		
Z 2	ENCODER, (349H74238)		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z2 FRONT PANEL II

CKT REF	DESCRIPTION	RATING	NOTE
J 1	Connector, (U-SA1001)		
Q 1	LED, (TLY226)		
R 1	Var, MF, (RG161N15SB 20k $\Omega$ M)	20k $\Omega$ , 1/2W	
R 2	Var, MF, (RG161N15SB 20k $\Omega$ M)	20k $\Omega$ , 1/2W	
S 1	Not assigned		
S 2	Switch, (HL20-NS)		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z6 p1st CONVERTER

CKT REF	DESCRIPTION	RATING	NOTE
AT 1	Attenuator	6dB	
C 1	Cer, (DF553F102PY50)	1000pF, $\pm 100/-10\%$ , 50V	
C 2	Cer, (DF553F102PY50)	1000pF, $\pm 100/-10\%$ , 50V	
C 3	Not assigned		
C 4	Cer, (DF553F102PY50)	1000pF, $\pm 100/-10\%$ , 50V	
J 1	Connector, (HRM101)		
J 2	Connector, (HRM304B)		
J 3	Connector, (HRM300-1)		
J 4	Receptacle, (27DP-BR)		
J 5	Socket, (DF1-5S2.5R28)		
J 6	Not assigned		
J 7	Cable, (442H79019)		
J 8	Connector, (HRM300-1)		
W 1	Coupler, (10dB)		
Z 1	Local amp		44W79551
Z 2	Harmonic mixer		
Z 3	If amp		44W79552

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List: Z6-Z1 LOCAL AMP

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CC732CK1H010C)	1pF, $\pm 0.25$ pF, 50V	
C 2	Cer, (CC732CH1H100D)	10pF, $\pm 0.5$ pF, 50V	
C 3	Pattern		
C 4	Cer, (CC732CK1H020C)	2pF, $\pm 0.25$ pF, 50V	
C 5	Cer, (CC732CH1H101J)	100pF, $\pm 5\%$ , 50V	
C 6	Cer, (CC732CH1H101J)	100pF, $\pm 5\%$ , 50V	
C 7	Not assigned		
C 8	Cer, (CC732CK1H010C)	1pF, $\pm 0.25$ pF, 50V	
C 9	Cer, (CC732CK1H010C)	1pF, $\pm 0.25$ pF, 50V	
C10	Cer, (CC732CH1H100D)	10pF, $\pm 0.5$ pF, 50V	
C11	Not assigned		
C12	Cer, (CC732CH1H101J)	100pF, $\pm 5\%$ , 50V	
C13	Cer, (CC732CH1H101J)	100pF, $\pm 5\%$ , 50V	
C14	Cer, (CC732CH1H100D)	10pF, $\pm 0.5$ pF, 50V	
C15	Not assigned		
C16	Cer, (CC732CH1H100D)	10pF, $\pm 0.5$ pF, 50V	
Q 1	Tr, (2SC2273)		
Q 2	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 3	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 4	Tr, (2SC2585)		
R 1	MF, (RM73B2B500JD)	50 $\Omega$ , $\pm 5\%$ , 1/8W	
R 2	MF, (RM73B2B500JD)	50 $\Omega$ , $\pm 5\%$ , 1/8W	
R 3	MF, (RM73B2B500JD)	50 $\Omega$ , $\pm 5\%$ , 1/8W	
R 4	MF, (RM73B2B332JD)	3.3k $\Omega$ , $\pm 5\%$ , 1/8W	
R 5	CF, (ARD25T221J)	220 $\Omega$ , $\pm 5\%$ , 1/4W	
R 6	MF, (RM73B2B151JD)	150 $\Omega$ , $\pm 5\%$ , 1/8W	
R 7	MF, (RM73B2B151JD)	150 $\Omega$ , $\pm 5\%$ , 1/8W	
R 8	MF, (RM73B2B332JD)	3.3k $\Omega$ , $\pm 5\%$ , 1/8W	
R 9	CF, (ARD25T221J)	220 $\Omega$ , $\pm 5\%$ , 1/4W	
R10	MF, (RM73B2B500JD)	50 $\Omega$ , $\pm 5\%$ , 1/8W	
R11	Not assigned		
R12	MF, (RM73B2B68JD)	6.8 $\Omega$ , $\pm 5\%$ , 1/8W	
R13	MF, (RM73B2B510JD)	51 $\Omega$ , $\pm 5\%$ , 1/8W	

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List: Z6-Z3 IF AMP

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C 2	Not assigned		
C 3	Not assigned		
C 4	Not assigned		
C 5	Cer, (CC732CH1H470J)	47pF, $\pm 5\%$ , 50V	
C 6	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C 7	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C 8	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C 9	Cer, (CC732CJ1H030C)	3pF, $\pm 0.25$ pF, 50V	
C10	Cer, (CC732CH1H040D)	8pF, $\pm 0.5$ pF, 50V	
C11	Not assigned		
C12	Cer, (CC732CH1H060D)	6pF, $\pm 5\%$ , 50V	
C13	Not assigned		
C14	Cer, (CC732CK1H020C)	2pF, $\pm 0.25$ pF, 50V	
C15	Not assigned		
C16	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
Q 1	Not assigned		
Q 2	Tr, (2SC2367)		
Q 3	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
R 1	Not assigned		
R 2	MF, (RM73B2B102JD)	1.0k $\Omega$ , $\pm 5\%$ , 1/8W	
R 3	MF, (RN14K2E6190D)	619 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R 4	MF, (RN14K2E1211D)	1.21k $\Omega$ , $\pm 0.5\%$ , 1/4W	

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z10 YTO/YTF DRIVE

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C 2	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C 3	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C 4	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C 5	Elect, (CE04W1E101)	100 $\mu$ F, $\pm 20\%$ , 25V	
C 6	Elect, (CE04W1E101)	100 $\mu$ F, $\pm 20\%$ , 25V	
C 7	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C 8	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm 20\%$ , 50V	
C 9	Elect, (CE04W1V220)	22 $\mu$ F, $\pm 20\%$ , 35V	
C10	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C11	Not assigned		
C12	Elect, (CE04W1V100)	10 $\mu$ F, $\pm 20\%$ , 35V	
C13	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C14	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C15	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C16	Tant, (CSE1VR47M)	0.47 $\mu$ F, $\pm 20\%$ , 35V	
C17	Not assigned		
C18	Elect, (CE04W1E101)	100 $\mu$ F, $\pm 20\%$ , 25V	
C19	Plast, (ECQ-M1H472KZ)	4700pF, $\pm 10\%$ , 50V	
C20	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C21	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C22	Cer, (CC45CH1H220JY)	22pF, $\pm 5\%$ , 50V	
C23	Elect, (CE04W1V220)	22 $\mu$ F, $\pm 20\%$ , 35V	
C24	Elect, (CE04W1J4R7)	4.7 $\mu$ F, $\pm 20\%$ , 63V	
C25	Elect, (CE04W1E101)	100 $\mu$ F, $\pm 20\%$ , 25V	
C26	Not assigned		
C27	Not assigned		
C28	Plast, (ECQ-V1H105JW)	1 $\mu$ F, $\pm 5\%$ , 50V	
C29	Cer, (CK924C1H222M)	2200pF, $\pm 20\%$ , 50V	
C30	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C31	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C32	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C33	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C34	Not assigned		
C35	Elect, (CE04W1J4R7)	4.7 $\mu$ F, $\pm 20\%$ , 63V	
C36	Plast, (ECQ-M1H472KZ)	4700pF, $\pm 10\%$ , 50V	
C37	Not assigned		
C38	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C39	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C40	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C41	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C42	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C43	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C44	Not assigned		
C45	Cer, (RPE113F105Z50)	1 $\mu$ F, $\pm 5\%$ , 50V	
C46	Elect, (CE04W1E101)	100 $\mu$ F, $\pm 20\%$ , 35V	

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z10 YTO/YTF DRIVE

CKT REF	DESCRIPTION	RATING	NOTE
J 1	Connector, (PI011-05M)		
J 2	Connector, (PI011-12M)		
J 3	Connector, (PI011-04M)		
J 4	Connector, (PI011-05M)		
J 5	Connector, (PI011-02M)		
J 6	Connector, (PI011-10M)		
J 7	Connector, (PI011-04M)		
J 8	Connector, (PI011-04M)		
J 9	Connector, (DF1-2P2.5DSA)		
J10	Connector, (PI011-02M)		
K 1	Relay, (NR-SD-12V)		
L 1	Coil, (LF8-221K)	220 $\mu$ H	
L 2	Coil, (LF8-220K)	22 $\mu$ H	
L 3	Coil, (LF8-221K)	220 $\mu$ H	
L 4	Not assigned		
L 5	Not assigned		
L 6	Coil, (SF-T8-50D)		
Q 1	IC, (LPC14312H)		
Q 2	Not assigned		
Q 3	IC, (LPC151C)		
Q 4	Di, (1S953)		
Q 5	Tr, (2SD568)		
Q 6	Not assigned		
Q 7	Not assigned		
Q 8	IC, (HI-201-5)		
Q 9	Di, breakdown, (1S252)	5.9 to 6.5V, 250mW	
Q10	Rectifier, (V03G)		
Q11	IC, (NE5534AP)		
Q12	Tr, (2SA836)		
Q13	Tr, (2SD297)		
Q14	Not assigned		
Q15	IC, (NE5532AP)		
Q16	Tr, (2SC1008)		
Q17	Tr, (2SA708)		
Q18	Not assigned		
Q19	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q20	IC, (LPC454D)		
Q21	Tr, (2SA836)		

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z10 YTO/YTF DRIVE				
CKT REF	DESCRIPTION	RATING		NOTE
Q22	Tr, (2SD568)			
Q23	Not assigned			
Q24	IC, (DTC143EF)			
Q25	Di, (1S953)			
R 1	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W		
R 2	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R 3	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R 4	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R 5	CF, (ARD25T473J)	47k $\Omega$ , $\pm 5\%$ , 1/4W		
R 6	CF, (ARD25T150J)	15 $\Omega$ , $\pm 5\%$ , 1/4W		
R 7	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R 8	Not assigned			
R 9	Not assigned			
R10	MF, (RN14K2E3011D)	3.01k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R11	MF, (RN14K2E3011D)	3.01k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R12	Var, MF, (RJ-6P 2k $\Omega$ )	2.0k $\Omega$ , 1/2W		
R13	MF, (RN14K2E1152D)	11.5k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R14	MF, (RN14K2E1503D)	150k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R15	MF, (RN14K2E1503D)	150k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R16	MF, (RN14K2E7150D)	715 $\Omega$ , $\pm 0.5\%$ , 1/4W		
R17	Var, MF, (RJ-6P 2k $\Omega$ )	2.0k $\Omega$ , 1/2W		
R18	MF, (RN14K2E8251D)	8.25k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R19	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W		
R20	MF, (RN14K2E3321D)	3.32k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R21	Var, MF, (RJ-6P 200 $\Omega$ )	200 $\Omega$ , 1/2W		
R22	WW, (RHF-10-22.1nF)	22.1n, $\pm 1\%$ , 10W		
R23	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R24	MF, (RN14K2E1471D)	1.47k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R25	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R26	Not assigned			
R27	Not assigned			
R28	MF, (RN14K2E1051D)	1.05k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R29	MF, (RN14K2E1051D)	1.05k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R30	MF, (RN14K2E2671D)	2.67k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R31	MF, (RN14K2E3011D)	3.01k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R32	Not assigned			
R33	Not assigned			
R34	MF, (RN14K2E1001D)	1.00k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R35	MF, (RN14K2E1001D)	1.00k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R36	Not assigned			
R37	CF, (ARD25T151J)	150 $\Omega$ , $\pm 5\%$ , 1/4W		
R38	MF, (RN14K2E1541D)	1.54k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R39	Var, MF, (RJ-6P 500 $\Omega$ )	500 $\Omega$ , 1/2W		
R40	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z10 YTO/YTF DRIVE				
CKT REF	DESCRIPTION	RATING		NOTE
R41	MF, (RN14K2E1000D)	100 $\Omega$ , $\pm 0.5\%$ , 1/4W		
R42	Not assigned			
R43	Not assigned			
R44	CF, (ARD25T105J)	1.0M $\Omega$ , $\pm 5\%$ , 1/4W		
R45	CF, (ARD25T105J)	1.0M $\Omega$ , $\pm 5\%$ , 1/4W		
R46	Var, MF, (RJ-6P 1k $\Omega$ )	1.0k $\Omega$ , 1/2W		
R47	MF, (RN14K2E7501D)	7.50k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R48	Var, MF, (RJ-6P 100 $\Omega$ )	100 $\Omega$ , 1/2W		
R49	MF, (RN14K2E4021D)	4.02k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R50	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R51	MF, (RN14K2E1331D)	1.33k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R52	MF, (RN14K2E2001D)	2.00k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R53	MF, (RN14K2E4021D)	4.02k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R54	MF, (RN14K2E1331D)	1.33k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R55	CF, (ARD25T561J)	560 $\Omega$ , $\pm 5\%$ , 1/4W		
R56	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R57	WW, (RHF-10-10nF)	10n, $\pm 1\%$ , 10W		
R58	CF, (ARD25T684J)	680k $\Omega$ , $\pm 5\%$ , 1/4W		
R59	Not assigned			
R60	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R61	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R62	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W		
R63	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R64	Not assigned			
R65	CF, (ARD25T105J)	1M $\Omega$ , $\pm 5\%$ , 1/4W		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z14 0 to 2 GHz RF BLOCK				
CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (DF553F102PY50)	1000pF, $\pm 100/-0\%$ , 50V		
C 2	Cer, (DF553F102PY50)	1000pF, $\pm 100/-0\%$ , 50V		
C 3	Cer, (DF553YN680KY50)	68pF, $\pm 10\%$ , 50V		
C 4	Cer, (DF553YN680KY50)	68pF, $\pm 10\%$ , 50V		
C 5	Cer, (DF553F102PY50)	1000pF, $\pm 100/-0\%$ , 50V		
J 1	Not assigned			
J 2	Not assigned			
J 3	Connector, (HRM-305B)			
J 4	Connector, (27DP-BR)			
J 5	Connector, (HRM-304B)			
J 6	Connector, (27DP-BR)			
J 7	Connector, (HRM-304B)			
J 8	Connector, (HRM-304B)			
J 9	Not assigned			
J10	Connector, (HRM-304B)			
J11	Connector, (HRM-301B)			
J12	Connector, (27DP-BR)			
J13	Connector, (27DP-BR)			
J14	Connector, (PI011-04F)			
J15	Connector, (27DP-LP-1.5QEW-AA)			
J16	Connector, (27DP-LP-1.5QEW-AA)			
Q 1	Di, (1S2208)			
Q 2	Di, (1S2208)			
R 1	MF, (RN14K2E1001D)	1.00k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R 2	MF, (RN14K2E1001D)	1.00k $\Omega$ , $\pm 0.5\%$ , 1/4W		
Z 1	1st MIX PAD			
Z 2	0 to 2 GHz 1st MIX			
Z 3	DIRECTIONAL FILTER			
Z 4	2.5214 GHz PRE AMP			
Z 5	2.5214 GHz BPF			
Z 6	2.5 GHz OSC			
Z 7	2nd CONVERTER			
Z 8	100 MHz REF OSC			
Z 9	2.5 to 4.5 GHz LO AMP			
Z10	2 to 6 GHz CPL AMP			
Z11	2nd LOCAL PLL			
Z12	CPL MODULE			

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z14 0 to 2 GHz RF BLOCK				
CKT REF	DESCRIPTION	RATING		NOTE
Z13	NOISE FILTER (ZFN5101-01R)			
Z14	NOISE FILTER (ZFN5101-01R)			
Z15	NOISE FILTER, (ZFN5101-01R)			
Z16	NOISE FILTER, (ZFN5101-01R)			
Z17	NOISE FILTER, (ZFN5101-01R)			

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z14-Z1 1st MIX PAD

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (HCC73CH2D*C)	0.5 to 3pF, ±0.25pF, 200V	Q'ty 0 or 1, *
R 1	MF, (RM73B2B151JD)	150Ω, ±5%, 1/8W	
R 2	MF, (RM73B2B390JD)	39Ω, ±5%, 1/8W	
R 3	MF, (RM73B2B151JD)	150Ω, ±5%, 1/8W	
R 4	MF, (RM73B2B*JD)	39 to 100Ω, ±5%, 1/8W	*

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z14-Z4 2.5214 GHz PRE AMP

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CC732CH1H220J)	22pF, ±5%, 50V	
C 2	Pattern		
C 3	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C 4	Pattern		
C 5	Cer, (CC732CH1H101J)	100pF, ±5%, 50V	
C 6	Cer, (CC732CH1H220J)	22pF, ±5%, 50V	
Q 1	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 2	Tr, (2SC2585)		
R 1	MF, (RM73B2B561JD)	560Ω, ±5%, 1/8W	
R 2	CF, (ARD25T391J)	390Ω, ±5%, 1/4W	

( ): Manufacturer's part number  
\* : Selected at factory

44W83931 1/1

Parts List : Z14-Z7 2nd CONVERTER

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CC732CH1H220J)	22pF, ±5%, 50V	
C 2	Cer, (CK734B1H104K)	0.1μF, ±10%, 50V	
C 3	Cer, (CC732CH1H220J)	22pF, ±5%, 50V	
C 4	Cer, (CC732CH1H101J)	100pF, ±5%, 50V	
C 5	Cer, (CC732CH1H101J)	100pF, ±5%, 50V	
C 6	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C 7	Cer, (CC732CH1H101J)	100pF, ±5%, 50V	
C 8	Cer, (CC732CH1H220J)	22pF, ±5%, 50V	
C 9	Cer, (CK734B1H104K)	0.1μF, ±10%, 50V	
C10	Not assigned		
C11	Cer, (CC732CH1H220J)	22pF, ±5%, 50V	
C12	Cer, (CC732CH1H040D)	4pF, ±0.5pF, 50V	
C13	Cer, (CC732CH1H040D)	4pF, ±0.5pF, 50V	
C14	Cer, (CC732CH1H060D)	6pF, ±0.5pF, 50V	
C15	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C16	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C17	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C18	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C19	Cer, (CC924CH1H560J)	56pF, ±5%, 50V	Q'ty 2
C20	Cer, (CC924CH1H910J)	91pF, ±5%, 50V	Q'ty 2
C21	Cer, (CC924CH1H560J)	56pF, ±5%, 50V	Q'ty 2
C22	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C23	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
L 1	Pattern		
L 2	Pattern		
L 3	Pattern		
L 4	Pattern		
L 5	Pattern		
L 6	Pattern		
L 7	Coil, (SP0408-4R7K)	4.7μH, 550mA	
L 8	Coil, (NL322522-R33K)	0.33μH, 450mA	
L 9	Coil, (NL322522-R33K)	0.33μH, 450mA	
L10	Coil, (LF8-221K)	220μH, 100mA	
Q 1	Di, breakdown, (PD6.2EB)	5.8 to 6.6V, 400mW	
Q 2	Tr, (2SC2585)		
Q 3	Di, (ND487R2-3P)		
Q 4	Di, (ND487R2-3P)		
Q 5	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 6	Tr, (2SC2367)		
Q 7	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q 8	Tr, (2SC2369)		
Q 9	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q10	Tr, (2SC2901)		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z14-Z7 2nd CONVERTER

CKT REF	DESCRIPTION	RATING	NOTE
R 1	MF, (RM73B2B152JD)	1.5kΩ, ±5%, 1/8W	
R 2	CF, (ARD25T561J)	560Ω, ±5%, 1/4W	
R 3	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R 4	MF, (RM73B2B182JD)	1.8kΩ, ±5%, 1/8W	
R 5	MF, (RM73B2B510JD)	51Ω, ±5%, 1/8W	
R 6	MF, (RM73B2B331JD)	330Ω, ±5%, 1/8W	
R 7	MF, (RM73B2B560JD)	56Ω, ±5%, 1/8W	
R 8	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R 9	MF, (RM73B2B101JD)	100Ω, ±5%, 1/8W	
R10	MF, (RM73B2B510JD)	51Ω, ±5%, 1/8W	
R11	CF, (ARD25T561J)	560Ω, ±5%, 1/4W	
R12	MF, (RM73B2B688JD)	6.8Ω, ±5%, 1/8W	
R13	MF, (RM73B2B688JD)	6.8Ω, ±5%, 1/8W	
R14	CF, (ARD25T561J)	560Ω, ±5%, 1/4W	
R15	MF, (RM73B2B151JD)	150Ω, ±5%, 1/8W	
R16	MF, (RM73B2B390JD)	39Ω, ±5%, 1/8W	
R17	MF, (RM73B2B151JD)	150Ω, ±5%, 1/8W	
R18	MF, (RM73B2B510JD)	100Ω, ±5%, 1/8W	
R19	MF, (RM73B2B221JD)	220Ω, ±5%, 1/8W	
R20	CF, (ARD25T4R7J)	4.7Ω, ±5%, 1/4W	
R21	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R22	MF, (RM73B2B470JD)	47Ω, ±5%, 1/8W	
R23	Var, MF, (RJ-6S 500Ω)	500Ω, 1/2W	
T 1	Trans, (342T74443)		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z14-Z8 100 MHz REF OSC				
CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (CE04W1E470)	47pF, ±20%, 25V		
C 2	Elect, (CE04W1E470)	47pF, ±20%, 25V		
C 3	Cer, (CK45B1H471KY)	470pF, ±10%, 50V		
C 4	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 5	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C 6	Elect, (CE04W1E470)	47pF, ±20%, 25V		
C 7	Cer, (CK45B1H471KY)	470pF, ±10%, 50V		
C 8	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 9	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C10	Elect, (CE04W1E470)	47pF, ±20%, 25V		
C11	Not assigned			
C12	Not assigned			
C13	Not assigned			
C14	Not assigned			
C15	Cer, (CK45B1H471KY)	470pF, ±10%, 50V		
C16	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C17	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C18	Not assigned			
C19	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C20	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V		
C21	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V		
C22	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C23	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C24	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C25	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C26	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C27	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C28	Cer, (CC45CH1H160JY)	16pF, ±5%, 50V		
C29	Cer, (CC45CH1H160JY)	16pF, ±5%, 50V		
C30	Cer, (CC45CH1H160JY)	16pF, ±5%, 50V		
C31	Cer, (CC45CH1H160JY)	16pF, ±5%, 50V		
L 1	Coil, (LF8-221K)	220μH		
L 2	Coil, (NL322522-R15K)	0.15μH		
L 3	Coil, (NL322522-R15K)	0.15μH		
L 4	Coil, (NL453232-R15K)	1.5μH		
L 5	Coil, (LF8-221K)	220μH		
Q 1	Di, breakdown, (RD9.1EB)	8.5 to 9.6V, 400mW		
Q 2	Tr, (2SC2901)			
Q 3	Tr, (μPCL651G)			
Q 4	IC, (μPC78L05)			
Q 5	Tr, (μPCL651G)			

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z14-Z8 100 MHz REF OSC				
CKT REF	DESCRIPTION	RATING		NOTE
Q 6	Di, breakdown, (PD6.2EB)	5.8 to 6.6V, 400mW		
Q 7	Not assigned			
Q 8	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q 9	Tr, (2SC2369)			
Q10	Di, (1SS97)			
Q11	Di, (1SS97)			
Q12	Tr, (2SA1206)			
R 1	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R 2	Not assigned			
R 3	CF, (ARD25T101J)	100Ω, ±5%, 1/4W		
R 4	CF, (ARD25T511J)	510Ω, ±5%, 1/4W		
R 5	CF, (ARD25T560J)	560Ω, ±5%, 1/4W		
R 6	CF, (ARD25T821J)	820Ω, ±5%, 1/4W		
R 7	CF, (ARD25T470J)	47Ω, ±5%, 1/4W		
R 8	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R 9	Not assigned			
R10	Not assigned			
R11	Not assigned			
R12	CF, (ARD25T470J)	47Ω, ±5%, 1/4W		
R13	Not assigned			
R14	Not assigned			
R15	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R16	Not assigned			
R17	Not assigned			
R18	Not assigned			
R19	Not assigned			
R20	Not assigned			
R21	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R22	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R23	Not assigned			
R24	CF, (ARD25T511J)	510Ω, ±5%, 1/4W		
R25	CF, (ARD25T511J)	510Ω, ±5%, 1/4W		
R26	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R27	CF, (ARD25T820J)	82Ω, ±5%, 1/4W		
R28	CF, (ARD25T102J)	1.0kΩ, ±5%, 1/4W		
R29	CF, (ARD25T102J)	1.0kΩ, ±5%, 1/4W		
R30	Var, MF, (RJ-651kΩ)	1kΩ, 1/2W		
R31	CF, (ARD25T102J)	1.0kΩ, ±5%, 1/4W		
R32	CF, (ARD25T391J)	390Ω, ±5%, 1/4W		
R33	CF, (ARD25T330J)	33Ω, ±5%, 1/4W		
R34	CF, (ARD25T560J)	56Ω, ±5%, 1/4W		
R35	CF, (ARD25T821J)	820Ω, ±5%, 1/4W		
R36	MF, (NRN 1/4C4131ΩD)	4.13kΩ, ±0.5%, 1/4W		
R37	MF, (NRN 1/4C444.8ΩD)	444.8Ω, ±0.5%, 1/4W		
R38	MF, (NRN 1/4C4130ΩD)	413Ω, ±0.5%, 1/4W		
Z 1	XTAL OSC, (TA302ANS061B)	100 MHz		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z14-Z29 2.5 to 4.5 GHz LO AMP				
CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CK1H010C)	1pF, ±0.25pF, 50V		
C 2	Cer, (CC732CK1H020C)	2pF, ±0.25pF, 50V		
C 3	Cer, (CC732CK1H020C)	2pF, ±0.25pF, 50V		
C 4	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C 5	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C 6	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C 7	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C 8	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C 9	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C10	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C11	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C12	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V		
C13	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V		
C14	Elect, (CE04W1E470)	47pF, ±20%, 25V		
Q 1	Tr, (2SC2585)			
Q 2	IC, (FJ451LE)			
Q 3	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q 4	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q 5	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
R 1	MF, (RM73B2B470JD)	47Ω, ±5%, 1/8W		
R 2	MF, (RM73B2B102JD)	10Ω, ±5%, 1/8W		
R 3	MF, (RM73B2B241JD)	24Ω, ±5%, 1/8W		
R 4	MF, (RM73B2B313JD)	13Ω, ±5%, 1/8W		
R 5	MF, (RM73B2B391JD)	39Ω, ±5%, 1/8W		
R 6	MF, (RM73B2B240JD)	24Ω, ±5%, 1/8W		
R 7	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R 8	MF, (RM73B2B271JD)	27Ω, ±5%, 1/8W		
R 9	MF, (RM73B2B180JD)	18Ω, ±5%, 1/8W		
R10	MF, (RM73B2B681JD)	68Ω, ±5%, 1/8W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z14-Z10 2 to 6 GHz CPL AMP				
CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CK1H010C)	1pF, ±0.25pF, 50V		
C 2	Cer, (CC732CH1H100D)	10pF, ±0.5pF, 50V		
C 3	Pattern			
C 4	Cer, (CC732CK1H020C)	2pF, ±0.25pF, 50V		
C 5	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C 6	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C 7	Not assigned			
C 8	Cer, (CC732CJ1H030C(M0))	3pF, ±0.25pF, 50V		
C 9	Not assigned			
C10	Cer, (CC732CH1H100D)	10pF, ±0.5pF, 50V		
C11	Not assigned			
C12	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C13	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C14	Cer, (CC732CH1H100D)	10pF, ±0.5pF, 50V		
Q 1	Tr, (2SC2273)			
Q 2	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q 3	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q 4	Tr, (2SC2585)			
R 1	MF, (RM73B2B500JD)	50Ω, ±5%, 1/8W		
R 2	MF, (RM73B2B500JD)	50Ω, ±5%, 1/8W		
R 3	MF, (RM73B2B500JD)	50Ω, ±5%, 1/8W		
R 4	MF, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R 5	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R 6	MF, (RM73B2B270JD)	27Ω, ±5%, 1/8W		
R 7	Not assigned			
R 8	MF, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R 9	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R10	MF, (RM73B2B500JD)	50Ω, ±5%, 1/8W		
R11	MF, (RM73B2B181JD)	180Ω, ±5%, 1/8W		
R12	MF, (RM73B2B560JD)	56Ω, ±5%, 1/8W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z14-Z11 2nd LOCAL PLL

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CC45CH1H180JY)	18pF, 5%, 50V	Q'ty 2, Parallel
C 2	Cer, (CC924CH1H221J)	220pF, ±5%, 50V	
C 3	Cer, (CK924F1H1042)	0.1μF, +80/-20%, 50V	
C 4	Cer, (CC924CH1H221J)	220pF, ±5%, 50V	
C 5	Not assigned		
C 6	Cer, (CC924CH1H102J)	1000pF, ±5%, 50V	
C 7	Cer, (CC924CH1H102J)	1000pF, ±5%, 50V	
C 8	Cer, (CK732B1H102K)	1000pF, ±10%, 50V	
C 9	Cer, (CK732C1H030C)	3pF, ±0.25pF, 50V	
C10	Cer, (CC924CH1H102J)	1000pF, ±5%, 50V	
C11	Cer, (CC45CJ1H030CY)	3pF, ±0.25pF, 50V	
C12	Cer, (CC45CJ1H030CY)	3pF, ±0.25pF, 50V	
C13	Cer, (CK924F1H1042)	0.1μF, +80/-20%, 50V	
C14	Cer, (CC924CH1H271J)	270pF, ±5%, 50V	
C15	Cer, (CC924CH1H271J)	270pF, ±5%, 50V	
C16	Cer, (CC924CH1H101J)	100pF, ±5%, 50V	
C17	Cer, (CC924CH1H102J)	1000pF, ±5%, 50V	
C18	Cer, (CC924CH1H102J)	1000pF, ±5%, 50V	
C19	Cer, (CK924CH1H472M)	4700pF, ±20%, 50V	
C20	Cer, (CK924CH1H104M)	0.1μF, ±20%, 50V	
C21	M Plast, (CF922N2A105K)	1μF, ±10%, 100V	
C22	Cer, (CC924CH1H102J)	1000pF, ±5%, 50V	
C23	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C24	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C25	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C26	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C27	Elect, (CE04W1E470)	47μF, ±20%, 25V	
J 1	Connector, (DIC-128)		
J 2	Connector, (DIC-149-3P)		
L 1	Pattern		
L 2	Pattern		
L 3	Coil, (LF8-100K)	10μH, 250mA	
L 4	Coil, (LF8-221K)	220μH, 100mA	
Q 1	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 2	Tr, (2SC2369)		
Q 3	Di, (1SS97)		
Q 4	Tr, (2SC2369)		
Q 5	Tr, (2SC2369)		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z14-Z11 2nd LOCAL PLL

CKT REF	DESCRIPTION	RATING	NOTE
Q 6	Di, (1SV107)		
Q 7	Di, (1SS97)		
Q 8	Di, (1SS97)		
Q 9	IC, (NE5532AP)		
Q 9	IC, (NE5532AP)		
R 1	CF, (ARD25T470J)	47Ω, ±5%, 1/4W	
R 2	CF, (ARD25T151J)	150Ω, ±5%, 1/4W	
R 3	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R 4	CF, (ARD25T220J)	22Ω, ±5%, 1/4W	
R 5	MF, (RN14K2H101J)	100Ω, ±5%, 1/4W	
R 6	MF, (NRTF1/4C 100J)	10Ω, ±5%, 1/4W	
R 7	MF, (NRTF1/4C 500J)	50Ω, ±5%, 1/4W	
R 8	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R 9	CF, (ARD25T182J)	1.8kΩ, ±5%, 1/4W	
R10	MF, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W	
R11	MF, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W	
R12	CF, (ARD25T154J)	150kΩ, ±5%, 1/4W	
R13	CF, (ARD25T154J)	150kΩ, ±5%, 1/4W	
R14	Var, MF, (RJ-6P 50KΩ)	50kΩ, 1/2W	
R15	MF, (RN14K2E6040D)	604Ω, ±0.5%, 1/4W	
R16	MF, (RN14K2E6040D)	604Ω, ±0.5%, 1/4W	
R17	MF, (RN14K2E6040D)	604Ω, ±0.5%, 1/4W	
R18	MF, (RN14K2E6040D)	604Ω, ±0.5%, 1/4W	
R19	Var, MF, (RA-12P 10KΩ)	10kΩ, 1/2W	
R20	MF, (RN14K2E4021D)	4.02kΩ, ±0.5%, 1/4W	
R21	MF, (RN14K2E4221D)	4.22kΩ, ±0.5%, 1/4W	
R22	MF, (RN14K2E2211D)	2.21kΩ, ±0.5%, 1/4W	
R23	MF, (RN14K2E1003D)	100kΩ, ±0.5%, 1/4W	
R24	CF, (ARD25T154J)	150kΩ, ±5%, 1/4W	
R25	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W	
R26	CF, (ARD25T221J)	220Ω, ±5%, 1/4W	
R27	CF, (ARD25T151J)	150Ω, ±5%, 1/4W	
R28	CF, (ARD25T151J)	150Ω, ±5%, 1/4W	
R29	Var, MF, (RJ-6P 100Ω)	100Ω, 1/2W	
R30	CF, (ARD25T181J)	180Ω, ±5%, 1/4W	
R31	CF, (ARD25T151J)	150Ω, ±5%, 1/4W	
R32	MF, (RM73B2B271JD)	270Ω, ±5%, 1/8W	
R33	MF, (RM73B2B180JD)	18Ω, ±5%, 1/8W	
R34	MF, (RM73B2B271JD)	270Ω, ±5%, 1/8W	
R35	CF, (ARD25T150J)	15Ω, ±5%, 1/4W	
T 1	Trans, (342T60521B)		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16 PLL BLOCK

CKT REF	DESCRIPTION	RATING	NOTE
AT1	Attenuator	20dB	
C 1	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	
C 2	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	
C 3	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	
C 4	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	
C 5	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	
C 6	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	
C 7	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	
C 8	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	
C 9	Cer, (DF553F102PY50)	1000pF, +100/-0%, 50V	
C10	Cer, (DF553YN680KY50)	68pF, ±10%, 50V	
J 1	Semirigid cable, (449J85925)		
J 2	Receptacle, (27DP-LR)		
J 3	Receptacle, (27DP-BR)		
J 4	Receptacle, (HRM-301B)		
J 5	Receptacle, (27DP-BR)		
J 6	Socket, (PI011-02P)		
J 7	Socket, (PI011-02P)		
J 8	Socket, (PI011-04P)		
J 9	Not assigned		
J10	Not assigned		
J11	Connector, (DF1-582.5R24)		
J12	Receptacle, (27DP-BR)		
J13	Plug, (27DP-LF-1.5)		
J14	Receptacle, (27DP-BR)		
J15	Semirigid cable, (449J85924)		
R 1	WW, (RHP-5J15Ω)	15Ω, ±1%, 5W	
Z 1	YTO PLL PREAMP		
Z 2	SAMPLER DRIVER		
Z 3	SAMPLER		
Z 4	ISOLATION AMP		
Z 5	PULSE AMP		
Z 6	M/N VCO		
Z 7	M/N MIX		
Z 8	5 X 100 MHz		
Z 9	YTO PD		
Z10	M/N PD		
Z11	LINE FILTER, (ZFN5101-01R)		
Z12	LINE FILTER, (ZFN5101-01R)		
Z13	LINE FILTER, (ZFN5101-01R)		
Z14	LINE FILTER, (ZFN5101-01R)		
Z15	HPF		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16-Z1 YTO PLL PRE AMP

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CK924CH1H102M)	1000pF, ±20%, 50V	
C 2	Cer, (CK924CH1H102M)	1000pF, ±20%, 50V	
C 3	Cer, (CK924CH1H104M)	0.1μF, ±20%, 50V	
C 4	Cer, (CK924CH1H102M)	1000pF, ±20%, 50V	
C 5	Cer, (CC924CH1H620J)	62pF, ±5%, 50V	
L 1	Coil, (SP0408-6R8K)	6.8μH	
L 2	Coil, (SP0408-4R7K)	4.7μH	
L 3	Coil, (SP0408-R15K)	0.15μH	
Q 1	Di, (1S953)		
Q 2	FET, (2SK152-2)		
Q 3	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
R 1	MF, (RN14K2E2003D)	200k, ±0.5%, 1/4W	
R 2	MF, (RN14K2E2003D)	200k, ±0.5%, 1/4W	
R 3	MF, (RN14K2E90R9D)	90.9Ω, ±0.5%, 1/4W	
R 4	CF, (ARD25T471J)	47Ω, ±5%, 1/4W	
R 5	MF, (RN14K2E49R9D)	49.9Ω, ±0.5%, 1/4W	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16-Z2 SAMPLER DRIVER

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CK924CH222M)	2200pF, ±20%, 50V	
C 2	EL Cer, (BLPW1E222NA)	2200pF, ±30%, 25V	
C 3	Cer, (CK924CH1H102J)	1000pF, ±5%, 50V	
C 4	Elect, (CE04W1V100)	10µF, ±20%, 35V	
C 5	Cer, (CK732B1H222K)	2200pF, ±10%, 50V	
L 1	Coil, (LF8-221K)	220µH	
Q 1	Di, (1SV107)		
R 1	MF, (NRTF1/4C 100J)	10Ω, ±5%, 1/4W	
R 2	MF, (NRTF1/4C 500J)	50Ω, ±5%, 1/4W	
R 3	Not assigned		
R 4	CF, (ARD25T102J)	1.0kΩ, ±5%, 1/4W	
R 5	CF, (ARD25T*J)	100Ω to 4.7kΩ, ±5%, 1/4W	*

( ) : Manufacturer's part number  
\* : Selected at factory.

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Parts List : Z16-Z4 ISOLATION AMP

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V	
C 2	Elect, (CE04W1E101)	100µF, ±20%, 25V	
C 3	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V	
C 4	Not assigned		
C 5	Not assigned		
C 6	Not assigned		
C 7	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V	
C 8	Elect, (CE04W1E101)	100µF, ±20%, 25V	
C 9	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V	
C10	Cer, (CK924F1H104Z)	0.1µF, +80/-20%	
C11	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
Q 1	Not assigned		
Q 2	Not assigned		
Q 3	Not assigned		
Q 4	Not assigned		
Q 5	Not assigned		
Q 6	Not assigned		
Q 7	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 8	IC, (µPC251C)		
Q 9	Tr, (2SC2721)		
Q10	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q11	Not assigned		
Q12	Tr, (2SA1154)		
Q13	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q14	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
R 1	CF, (ARD25T100J)	10Ω, ±5%, 1/4W	
R 2	Not assigned		
R 3	Not assigned		
R 4	Not assigned		
R 5	Not assigned		
R 6	CF, (ARD25T562J)	5.6kΩ, ±5%, 1/4W	
R 7	CF, (ARD25T562J)	5.6kΩ, ±5%, 1/4W	
R 8	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R 9	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R10	Not assigned		
R11	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R12	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R13	CF, (ARD25T562J)	5.6kΩ, ±5%, 1/4W	
R14	CF, (ARD25T562J)	5.6kΩ, ±5%, 1/4W	
R15	Not assigned		
R16	CF, (ARD25T100J)	10Ω, ±5%, 1/4W	

( ) : Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16-Z5 PULSE AMP

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CK732B1H102K)	1000pF, ±10%, 50V	
C 2	Cer, (CK732B1H102K)	1000pF, ±10%, 50V	
C 3	Cer, (CK732B1H102K)	1000pF, ±10%, 50V	
C 4	Elect, (CE04W1E470)	47µF, ±20%, 25V	
C 5	Cer, (CK924CH472M)	4700pF, ±20%, 50V	
C 6	Not assigned		
C 7	Elect, (CE04W1A470)	47µF, ±20%, 10V	
C 8	Cer, (CK924CH104M)	0.1µF, ±20%, 50V	
C 9	Cer, (CK924CH104M)	0.1µF, ±20%, 50V	
C10	Cer, (CK924CH1222M)	2200pF, ±20%, 50V	
C11	Cer, (CK924CH1222M)	2200pF, ±20%, 50V	
C12	Not assigned		
C13	Cer, (CK924CH472M)	4700pF, ±20%, 50V	
C14	Not assigned		
C15	Cer, (CK924CH1222M)	2200pF, ±20%, 50V	
C16	Cer, (CK924CH472M)	4700pF, ±20%, 50V	
C17	Cer, (CK924CH1222M)	2200pF, ±20%, 50V	
C18	Cer, (CK924CH1222M)	2200pF, ±20%, 50V	
C19	Cer, (CK732B1H222K)	2200pF, ±10%, 50V	
C20	Cer, (CK732B1H222K)	2200pF, ±10%, 50V	
C21	Cer, (CK732B1H222K)	2200pF, ±10%, 50V	
C22	Not assigned		
C23	Cer, (CK732B1H102K)	1000pF, ±10%, 50V	
C24	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V	
L 1	Coil, (LP8-101K)	100µH	
L 2	Coil, (LP8-101K)	100µH	
L 3	Not assigned		
L 4	Coil, (LP8-100K)	10µH	
L 5	Coil, (LP8-100K)	10µH	
Q 1	IC, (µPB581C)		
Q 2	Not assigned		
Q 3	IC, (11CO5DC)		
Q 4	Not assigned		
Q 5	Di, breakdown, (RD3.9EB)	3.7 to 4.1V, 400mW	
Q 6	Tr, (2SC2369)		
Q 7	Di, (1SS98)		
Q 8	Tr, (2SC2369)		
Q 9	Tr, (2SC2369)		
Q10	IC, (µPC1653A)		
Q11	IC, (µPC1651G)		

( ) : Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16-Z5 PULSE AMP

CKT REF	DESCRIPTION	RATING	NOTE
R 1	MF, (RM73B2B471JD)	470Ω, ±5%, 1/8W	
R 2	MF, (RM73B2B510JD)	510Ω, ±5%, 1/8W	
R 3	Not assigned		
R 4	Not assigned		
R 5	Not assigned		
R 6	Not assigned		
R 7	MF, (RM73B2B103JD)	10kΩ, ±5%, 1/8W	
R 8	CF, (ARD25T221J)	220Ω, ±5%, 1/4W	
R 9	CF, (ARD25T220J)	220Ω, ±5%, 1/4W	
R10	CF, (ARD25T750J)	75Ω, ±5%, 1/4W	
R11	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R12	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R13	CF, (ARD25T820J)	82Ω, ±5%, 1/4W	
R14	MF, (RM73B2B680JD)	68Ω, ±5%, 1/8W	
R15	MF, (RM73B2B151JD)	150Ω, ±5%, 1/8W	
R16	MF, (RM73B2B680JD)	68Ω, ±5%, 1/8W	
R17	MF, (RM73B2B101JD)	100Ω, ±5%, 1/8W	
R18	MF, (RM73B2B750JD)	75Ω, ±5%, 1/8W	
R19	MF, (RM73B2B101JD)	100Ω, ±5%, 1/8W	
T 1	Not assigned		
T 2	Trans, (342T60521)		

( ) : Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16-Z6 M/N VCO				
CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Cer, (CC732CK1H100D)	10pF, ±0.5pF, 50V		
C 3	Cer, (CC732CK1H095C)	0.5pF, ±0.25pF, 50V		
C 4	Cer, (CC732CJ1H030C)	3pF, ±0.25pF, 50V		
C 5	Not assigned			
C 6	Not assigned			
C 7	Cer, (CC732CH1H220J)	22pF, ±5%, 50V		
C 8	Cer, (CC732CH1H220J)	22pF, ±5%, 50V		
C 9	Not assigned			
C10	Cer, (CC732CK1H020C)	2pF, ±0.25pF, 50V		
C11	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
C12	Cer, (CK734B1H104K)	0.1μF, ±10%, 50V		
C13	Elect, (CE04W1V220)	22μF, ±20%, 35V		
C14	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C15	Cer, (CK924C1H*M)	2200pF to 0.1μF, ±20%, 50V		Q'ty 0 or 1,*
C16	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C17	Cer, (CC732CJ1H030C)	3pF, ±0.25pF, 50V		
C18	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
C19	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C20	Not assigned			
C21	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C22	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C23	Elect, (CE04W1V220)	22μF, ±20%, 35V		
C24	Cer, (C4532Y5V1H105Z)	1μF, +80/-20%, 50V		
C25	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C26	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C27	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C28	Cer, (CC732CK1H020C)	2pF, ±0.25pF, 50V		
C29	Cer, (CC732CK1H020C)	2pF, ±0.25pF, 50V		
C30	Not assigned			
C31	Not assigned			
C32	Not assigned			
C33	Cer, (CC732CJ1H030C)	3pF, ±0.25pF, 50V		
C34	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
L 1	Not assigned			
L 2	Not assigned			
L 3	Not assigned			
L 4	Coil, (MLF3216DR10K)	0.1μH		
L 5	Coil, (MLF3216DR10K)	0.1μH		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16-Z6 M/N VCO				
CKT REF	DESCRIPTION	RATING		NOTE
L 6	Coil, (MLF3216DR10K)	0.1μH		
L 7	Coil, (MLF3216DR10K)	0.1μH		
L 8	Coil, (MLF3216DR10K)	0.1μH		
L 9	Coil, (SP0408-6R8K)	6.8μH		
Q 1	Tr, (2SC2149)			
Q 2	Di, (1SV164)			
Q 3	Di, (1SV164)			
Q 4	Di, (1SV164)			
Q 5	Di, (1SV164)			
Q 6	Tr, (2SC2367)			
Q 7	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q 8	Not assigned			
Q 9	Not assigned			
Q10	Tr, (2SC2367)			
Q11	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
R 1	MF, (RM73B2B470JD)	47k, ±5%, 1/8W		
R 2	MF, (RM73B2B100JD)	10k, ±5%, 1/8W		
R 3	MF, (RM73B2B100JD)	10k, ±5%, 1/8W		
R 4	Not assigned			
R 5	CF, (ARD25T272J)	2.7kΩ, ±5%, 1/4W		
R 6	CF, (ARD25T272J)	2.7kΩ, ±5%, 1/4W		
R 7	CF, (ARD25T271J)	270k, ±5%, 1/4W		
R 8	MF, (RM73B2B470JD)	47k, ±5%, 1/8W		
R 9	MF, (RM73B2B102JD)	1k, ±5%, 1/8W		
R10	CF, (ARD25T821J)	820k, ±5%, 1/4W		
R11	CF, (ARD25T100JD)	10k, ±5%, 1/4W		
R12	Not assigned			
R13	Not assigned			
R14	CF, (ARD25T821J)	820k, ±5%, 1/4W		
R15	Not assigned			
R16	Not assigned			
R17	MF, (RM73B2B102JD)	1k, ±5%, 1/8W		
R18	CF, (ARD25T821J)	820k, ±5%, 1/4W		
R19	CF, (ARD25T821J)	820k, ±5%, 1/4W		
R20	MF, (RM73B2B471JD)	470k, ±5%, 1/8W		
R21	MF, (RM73B2B560JD)	56k, ±5%, 1/8W		
R22	Not assigned			
R23	MF, (RM73B2B331JD)	330k, ±5%, 1/8W		
R24	MF, (RM73B2B180JD)	18k, ±5%, 1/8W		
R25	MF, (RM73B2B331JD)	330k, ±5%, 1/8W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16-Z7 M/N MIX				
CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CJ1H030C)	3pF, ±0.25pF, 50V		
C 2	Not assigned			
C 3	Cer, (CC732CH1H060D)	6pF, ±0.5pF, 50V		
C 4	Not assigned			
C 5	Not assigned			
C 6	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C 7	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C 8	Cer, (C4532Y5V1H105Z)	1μF, +80/-20%, 50V		
C 9	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C10	Cer, (CK732B1H102K)	1000pF, ±10%, 50V		
C11	Not assigned			
C12	Not assigned			
C13	Not assigned			
C14	Not assigned			
C15	Cer, (CC732CH1H220J)	22pF, ±5%, 50V		
C16	Cer, (CC732CH1H040D)	4pF, ±0.5pF, 50V		
C17	Cer, (CC732CH1H470J)	47pF, ±5%, 50V		
C18	Cer, (CC732CH1H090D)	9pF, ±0.5pF, 50V		
C19	Cer, (CC732CH1H330J)	33pF, ±5%, 50V		
C20	Not assigned			
C21	Cer, (CK924C1H473M)	0.047μF, ±20%, 50V		
C22	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C23	Cer, (CK924C1H473M)	0.047μF, ±20%, 50V		
C24	Cer, (CK924C1H472M)	4700pF, ±20%, 50V		
C25	Cer, (CC732CH1H330J)	33pF, ±5%, 50V		
C26	Not assigned			
C27	Cer, (CC732CH1H040D)	4pF, ±0.5pF, 50V		
C28	Cer, (CC732CH1H270J)	27pF, ±5%, 50V		
C29	Not assigned			
C30	Not assigned			
C31	Cer, (CK732C1H223M)	0.022μF, ±20%, 50V		
C32	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C33	Cer, (CK924C1H472M)	4700pF, ±20%, 50V		
C34	Cer, (CK924C1H473M)	0.047μF, ±20%, 50V		
C35	Cer, (CK924C1H473M)	0.047μF, ±20%, 50V		
C36	Cer, (CK924CH1H101J)	100pF, ±5%, 50V		
C37	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V		
C38	Elect, (CE04W1E101)	100μF, ±20%, 25V		
C39	Not assigned			
L 1	Coil, (MLF3216DR10K)	0.1μH		
L 2	Coil, (MLF3216DR10K)	0.1μH		
L 3	Not assigned			
L 4	Not assigned			
L 5	Coil, (SP0408-10M)	0.1μH		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16-Z7 M/N MIX				
CKT REF	DESCRIPTION	RATING		NOTE
L 6	Not assigned			
L 7	Not assigned			
L 8	Not assigned			
L 9	Not assigned			
L10	Not assigned			
L11	Coil, (SP0408-6R8K)	6.8μH		
L12	Coil, (LF8-101K)	100μH		
L13	Not assigned			
Q 1	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q 2	Tr, (2SC2367)			
Q 3	Not assigned			
Q 4	Not assigned			
Q 5	Not assigned			
Q 6	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q 7	Tr, (2SC2369)			
Q 8	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q 9	Tr, (2SC2369)			
Q10	Di, (1SS97)			
Q11	Di, (1SS97)			
R 1	CF, (ARD25T821J)	820k, ±5%, 1/4W		
R 2	CF, (ARD25T821J)	820k, ±5%, 1/4W		
R 3	MF, (RM73B2B102JD)	1k, ±5%, 1/8W		
R 4	Not assigned			
R 5	CF, (ARD25T470J)	47k, ±5%, 1/4W		
R 6	CF, (ARD25T471J)	470k, ±5%, 1/4W		
R 7	CF, (ARD25T391J)	390k, ±5%, 1/4W		
R 8	CF, (ARD25T150J)	15k, ±5%, 1/4W		
R 9	CF, (ARD25T470J)	47k, ±5%, 1/4W		
R10	Not assigned			
R11	CF, (ARD25T470J)	47k, ±5%, 1/4W		
R12	CF, (ARD25T471J)	470k, ±5%, 1/4W		
R13	CF, (ARD25T331J)	330k, ±5%, 1/4W		
R14	CF, (ARD25T470J)	47k, ±5%, 1/4W		
R15	Not assigned			
R16	MF, (RM73B2B181JD)	18k, ±5%, 1/8W		
R17	MF, (RM73B2B330JD)	33k, ±5%, 1/8W		
R18	MF, (RM73B2B181JD)	18k, ±5%, 1/8W		
R19	MF, (RM73B2B221JD)	22k, ±5%, 1/8W		
R20	MF, (RM73B2B220JD)	22k, ±5%, 1/8W		
R21	MF, (RM73B2B221JD)	22k, ±5%, 1/8W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z16-Z7 M/N MIX

CKT REF	DESCRIPTION	RATING	NOTE
Z 1	M-14-ML(R.K)		
Z 2	DB-2(R.K)		
Z 3	ARW-1000MF, (44Z46089)		

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z16-Z8 5X 100 MHz

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Elect, (CE04W1E101)	100 $\mu$ F, $\pm$ 20%, 25V	
C 2	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C 3	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C 4	Cer, (CC924CH1H221J)	220pF, $\pm$ 5%, 50V	
C 5	Cer, (CC924CH1H221J)	220pF, $\pm$ 5%, 50V	
C 6	Cer, (CC924CH1H221J)	220pF, $\pm$ 5%, 50V	
C 7	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C 8	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C 9	Cer, (CC924CH1H101J)	100pF, $\pm$ 5%, 50V	
C10	Not assigned		
C11	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C12	Cer, (RPE113F105Z50)	1 $\mu$ F, $\pm$ 80/-20%, 50V	
C13	Cer, (RPE113F105Z50)	1 $\mu$ F, $\pm$ 80/-20%, 50V	
C14	Cer, (RPE113F105Z50)	1 $\mu$ F, $\pm$ 80/-20%, 50V	
C15	Not assigned		
C16	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C17	Elect, (CE04W1E101)	100 $\mu$ F, $\pm$ 20%, 25V	
C18	Cer, (CC924CH1H101J)	100pF, $\pm$ 5%, 50V	
C19	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C20	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C21	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C22	Cer, (CC924CH1H101J)	100pF, $\pm$ 5%, 50V	
C23	Not assigned		
C24	Cer, (CC45CH1H100DY)	10pF, $\pm$ 0.5pF, 50V	
C25	Cer, (CC45CH1H330JY)	33pF, $\pm$ 5%, 50V	
C26	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C27	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C28	Cer, (CC924CH1H331J)	330pF, $\pm$ 5%, 50V	
C29	Not assigned		
C30	Cer, (CC924CH1H101J)	100pF, $\pm$ 5%, 50V	
C31	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C32	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C33	Cer, (CC924CH1H101J)	100pF, $\pm$ 5%, 50V	
C34	Cer, (CC45CH1H100DY)	10pF, $\pm$ 0.5pF, 50V	
C35	Cer, (CC45CH1H330JY)	33pF, $\pm$ 5%, 50V	
C36	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C37	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C38	Cer, (CC924CH1H331J)	330pF, $\pm$ 5%, 50V	
L 1	Coil, (LF8-101K)	100 $\mu$ H	
L 2	Coil, (SP0408-R10M)	0.1 $\mu$ H	
L 3	Not assigned		
L 4	Coil, (SP0408-R10M)	0.1 $\mu$ H	
L 5	Not assigned		

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z16-Z8 5X 100 MHz

CKT REF	DESCRIPTION	RATING	NOTE
L 6	Coil, (SP0408-R10M)	0.1 $\mu$ H	
L 7	Coil, (34L74430C)		
L 8	Coil, (SP0408-R10M)	0.1 $\mu$ H	
L 9	Coil, (34L74430C)		
L10	Coil, (SP0408-R10M)	0.1 $\mu$ H	
Q 1	Tr, (2SC2369)		Q'ty 2
Q 2	Di, (1SS97)		
Q 3	Tr, (2SC2408A)		
Q 4	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 5	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 6	FET, (3SK129R)		
Q 7	Di, breakdown, (RD5.1EB(3))	4.95 to 5.2V, 400mW	
Q 8	Tr, (2SC2369)		
Q 9	FET, (3SK129R)		
Q10	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q11	Tr, (2SC2369)		
R 1	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm$ 5%, 1/4W	
R 2	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm$ 5%, 1/4W	
R 3	CF, (ARD25T471J)	470 $\Omega$ , $\pm$ 5%, 1/4W	
R 4	CF, (ARD25T470J)	47 $\Omega$ , $\pm$ 5%, 1/4W	
R 5	CF, (ARD25T221J)	220 $\Omega$ , $\pm$ 5%, 1/4W	
R 6	MF, (RS2FB 47 $\Omega$ J)	47 $\Omega$ , $\pm$ 5%, 2W	
R 7	MF, (RS2FB 47 $\Omega$ J)	47 $\Omega$ , $\pm$ 5%, 2W	
R 8	CF, (ARD25T101J)	100 $\Omega$ , $\pm$ 5%, 1/4W	
R 9	MF, (NRTE1/4C 33 $\Omega$ J)	33 $\Omega$ , $\pm$ 5%, 1/4W	
R10	MF, (NRTE1/4C 47 $\Omega$ J)	47 $\Omega$ , $\pm$ 5%, 1/4W	
R11	CF, (ARD25T102J)	1k $\Omega$ , $\pm$ 5%, 1/4W	
R12	CF, (ARD25T561J)	560 $\Omega$ , $\pm$ 5%, 1/4W	
R13	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm$ 5%, 1/4W	
R14	CF, (ARD25T331J)	330 $\Omega$ , $\pm$ 5%, 1/4W	
R15	Not assigned		
R16	CF, (ARD25T102J)	1k $\Omega$ , $\pm$ 5%, 1/4W	
R17	CF, (ARD25T153J)	15k $\Omega$ , $\pm$ 5%, 1/4W	
R18	Not assigned		
R19	Not assigned		
R20	Not assigned		
R21	CF, (ARD25T102J)	1k $\Omega$ , $\pm$ 5%, 1/4W	
R22	CF, (ARD25T471J)	470 $\Omega$ , $\pm$ 5%, 1/4W	
R23	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm$ 5%, 1/4W	
R24	CF, (ARD25T331J)	330 $\Omega$ , $\pm$ 5%, 1/4W	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z16-Z8 5X 100 MHz

CKT REF	DESCRIPTION	RATING	NOTE
Z 1	BPF, (252MXPR-2700F)		500MHz
Z 2	BPF, (252MXPR-2700F)		500MHz
Z 3	BPF, (252MXPR-2700F)		500MHz

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z16-Z9 YTO PD

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C 2	Cer, (CC924CH1H471J)	470pF, ±5%, 50V	
C 3	Not assigned		
C 4	Not assigned		
C 5	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C 6	Not assigned		
C 7	Cer, (CC924CH1H680J)	68pF, ±5%, 50V	
C 8	Not assigned		
C 9	Not assigned		
C10	Cer, (CC924CH1H101J)	100pF, ±5%, 50V	
C11	Cer, (CC924CH1H101J)	100pF, ±5%, 50V	
C12	Not assigned		
C13	Not assigned		
C14	Cer, (CC924CH1H680J)	68pF, ±5%, 50V	
C15	Cer, (CC924CH1H680J)	68pF, ±5%, 50V	
C16	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C17	Cer, (CC924CH1H471J)	470pF, ±5%, 50V	
C18	Cer, (CC924CH1H221J)	220pF, ±5%, 50V	
C19	Cer, (CC924CH1H470J)	47pF, ±5%, 50V	
C20	Cer, (CC924CH1H101J)	100pF, ±5%, 50V	
C21	Cer, (CC924CH1H100D)	10pF, ±0.5pF, 50V	
C22	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C23	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C24	Not assigned		
C25	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C26	Cer, (CC924CH1H471J)	470pF, ±5%, 50V	
C27	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C28	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C29	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C30	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C31	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C32	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C33	Cer, (CC924CH1H471J)	470pF, ±5%, 50V	
C34	Not assigned		
C35	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C36	Elect, (CE04W1A470)	47μF, ±20%, 10V	
C37	Elect, (CE04W1A470)	47μF, ±20%, 10V	
C38	Not assigned		
C39	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C40	Elect, (CE04W1A101)	100μF, ±20%, 10V	
C41	Cer, (CC924CH1H151J)	150pF, ±5%, 50V	
C42	Cer, (CC924CH1H151J)	150pF, ±5%, 50V	
C43	Cer, (CC924CH1H220J)	22pF, ±5%, 50V	
C44	Elect, (CE04W1E101)	100pF, ±20%, 25V	
C45	Elect, (CE04W1E101)	100pF, ±20%, 25V	

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z16-Z9 YTO PD

CKT REF	DESCRIPTION	RATING	NOTE
C46	Elect, (CE04W1E101)	100μF, ±20%, 25V	
L 1	Coil, (SP0408-R22K)	0.22μH	
L 2	Coil, (SP0408-R22K)	0.22μH	
L 3	Not assigned		
L 4	Not assigned		
L 5	Coil, (LF8-101K)		
L 6	Not assigned		
L 7	Coil, (LF8-470K)	47μH	
L 8	Coil, (LF8-470K)	47μH	
L 9	Coil, (LF8-101K)	100μH	
L10	Not assigned		
L11	Coil, (LF8-101K)	100μH	
Q 1	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q 2	Tr, (2SC2369)		
Q 3	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q 4	Tr, (2SC2369)		
Q 5	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q 6	Tr, (2SC2369)		
Q 7	Di, (1S953)		
Q 8	Tr, (2SC2369)		
Q 9	Di, (1S953)		
Q10	Di, (1S953)		
Q11	Di, (1S953)		
Q12	Not assigned		
Q13	Not assigned		
Q14	IC, (MC12040L)		
Q15	IC, (NE5534AP)		
Q16	IC, (μPC1651G)		
R 1	Not assigned		
R 2	Not assigned		
R 3	Not assigned		
R 4	Not assigned		
R 5	Not assigned		
R 6	Not assigned		
R 7	CF, (ARD25T561J)	560Ω, ±5%, 1/4W	
R 8	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R 9	CF, (ARD25T68J)	6.8Ω, ±5%, 1/4W	
R10	CF, (ARD25T68J)	6.8Ω, ±5%, 1/4W	
R11	CF, (ARD25T100J)	10Ω, ±5%, 1/4W	
R12	Not assigned		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z16-Z9 YTO PD

CKT REF	DESCRIPTION	RATING	NOTE
R13	CF, (ARD25T470J)	47Ω, ±5%, 1/4W	
R14	CF, (ARD25T470J)	47Ω, ±5%, 1/4W	
R15	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R16	CF, (ARD25T821J)	820Ω, ±5%, 1/4W	
R17	CF, (ARD25T100J)	10Ω, ±5%, 1/4W	
R18	CF, (ARD25T470J)	47Ω, ±5%, 1/4W	
R19	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R20	CF, (ARD25T471J)	470Ω, ±5%, 1/4W	
R21	CF, (ARD25T100J)	10Ω, ±5%, 1/4W	
R22	CF, (ARD25T560J)	56Ω, ±5%, 1/4W	
R23	Not assigned		
R24	Not assigned		
R25	CF, (ARD25T821J)	820Ω, ±5%, 1/4W	
R26	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R27	CF, (ARD25T221J)	220Ω, ±5%, 1/4W	
R28	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R29	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R30	CF, (ARD25T151J)	150Ω, ±5%, 1/4W	
R31	CF, (ARD25T151J)	150Ω, ±5%, 1/4W	
R32	Not assigned		
R33	Not assigned		
R34	MF, (RN14K2E5110D)	511Ω, ±0.5%, 1/4W	
R35	MF, (RN14K2E5110D)	511Ω, ±0.5%, 1/4W	
R36	Not assigned		
R37	Not assigned		
R38	MF, (RN14K2E5110D)	511Ω, ±0.5%, 1/4W	
R39	MF, (RN14K2E5110D)	511Ω, ±0.5%, 1/4W	
R40	MF, (RN14K2E5110D)	511Ω, ±0.5%, 1/4W	
R41	CF, (ARD25T820J)	82Ω, ±5%, 1/4W	
R42	MF, (RN14K2E4320D)	432Ω, ±0.5%, 1/4W	
R43	MF, (RN14K2E2491D)	2.49kΩ, ±0.5%, 1/4W	
R44	CF, (ARD25T223J)	22kΩ, ±5%, 1/4W	
R45	Var.MF, (RJ-6P 100kΩ)	100kΩ, 1/2W	
R46	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R47	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z16-Z10 M/N PD

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C 2	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C 3	Cer, (CK924C1H104M)	0.1μF, ±20%, 50V	
C 4	Not assigned		
C 5	Elect, (CE04W1E470)	47μF, ±20%, 50V	
C 6	Cer, (CK924C1H104M)	0.1μF, ±20%, 50V	
C 7	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C 8	Plast, (ECQ-V1H224JW)	0.22μF, ±5%, 50V	
C 9	Cer, (CK924C1H104M)	0.1μF, ±20%, 50V	
C10	Not assigned		
C24	Not assigned		
C25	Elect, (CE04W1E101)	100μF, ±20%, 25V	
C26	Tant, (CS-ELD2R2M)	2.2μF, ±20%, 20V	
C27	Not assigned		
C28	Not assigned		
C29	Elect, (CE04W1V100)	10μF, ±20%, 35V	
C30	Elect, (CE04W1V100)	10μF, ±20%, 35V	
C31	Not assigned		
C32	Not assigned		
C33	Tant, (CS-ELC3R3M)	3.3μF, ±20%, 16V	
C34	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C35	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C36	Not assigned		
C37	Elect, (CE04W1E101)	100μF, ±20%, 25V	
C38	Not assigned		
C39	Not assigned		
C40	Cer, (RPE111CH201G50)	200pF, ±2%, 50V	
C41	Cer, (RPE111CH201G50)	200pF, ±2%, 50V	
C42	Plast, (ECQ-V1H105JW)	1μF, ±5%, 50V	
C43	Plast, (ECQ-V1H474JW)	0.47μF, ±5%, 50V	
C44	Plast, (ECQ-V1H474JW)	0.47μF, ±5%, 50V	
C45	Plast, (ECQ-V1H474JW)	0.47μF, ±5%, 50V	
C46	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C47	Not assigned		
C48	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C49	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C50	Not assigned		
C51	Not assigned		
C52	Elect, (CE04W1E101)	100μF, ±20%, 25V	
C53	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C54	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C55	Not assigned		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z16-210 M/N PD

CKT REF	DESCRIPTION	RATING	NOTE
C56	Elect, (CE04W1E101)	100 $\mu$ F, $\pm$ 20%, 25V	
C57	Elect, (CE04W1E470)	47 $\mu$ F, $\pm$ 20%, 25V	
C58	Not assigned		
C59	Not assigned		
C60	Elect, (CE04W1A101)	100 $\mu$ F, $\pm$ 20%, 10V	
C61	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm$ 20%, 50V	
C62	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm$ 20%, 50V	
C63	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm$ 20%, 50V	
J 1	Connector, (HIF23A-26D-AA40S)		
L 1	Coil, (LF8-101K)	100 $\mu$ H	
L 2	Coil, (LF8-101K)	100 $\mu$ H	
L 3	Not assigned		
L 4	Not assigned		
L 5	Not assigned		
L 6	Coil, (LF8-221K)	220 $\mu$ H	
L 7	Coil, (LF8-221K)	220 $\mu$ H	
L 8	Not assigned		
L 9	Not assigned		
L10	Not assigned		
L11	Coil, (LF8-221K)	220 $\mu$ H	
L12	Coil, (LF8-221K)	220 $\mu$ H	
L13	Coil, (339T20198G)		
L14	Coil, (339T20199A)		
L15	Coil, (339T20198G)		
Q 1	Di, (11C91)		
Q 2	Di, (1S953)		
Q 3	Tr, (2SC2570A)		
Q 4	IC, (74F191PC)		
Q 5	IC, (74F191PC)		
Q 6	IC, (74F191PC)		
Q 7	IC, (74S00)		
Q 8	IC, (MC4044P)		
Q 9	Not assigned		
Q10	Not assigned		
Q11	Not assigned		
Q12	Not assigned		
Q13	Not assigned		
Q14	Not assigned		
Q15	IC, (TC4053BP)		

( ): Manufacturer's part number  
\* : Selected at factory.

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Parts List : Z16-210 M/N PD

CKT REF	DESCRIPTION	RATING	NOTE
Q16	IC, (TC4053BP)		
Q17	IC, (NE5532A)		
Q18	Not assigned		
Q19	Not assigned		
Q20	IC, (NE5534A)		
Q21	Not assigned		
Q22	Not assigned		
Q23	Not assigned		
Q24	Not assigned		
Q25	Not assigned		
Q26	Not assigned		
Q27	Not assigned		
Q28	Not assigned		
Q29	IC, (NE5532A)		
Q30	IC, ( $\mu$ PC649D)		
Q31	Not assigned		
Q32	Not assigned		
Q33	IC, ( $\mu$ PC14308H)		
Q34	Di, (1S953)		
Q35	IC, ( $\mu$ PC16308H)		
Q36	Not assigned		
Q37	Not assigned		
Q38	Di, (1S953)		
Q39	Di, (1S953)		
Q40	Di, (1S953)		
Q41	Di, (1S953)		
Q42	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q43	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q44	IC, ( $\mu$ PC14308H)		
Q45	Tr, (2SD568)		
Q46	Di, breakdown, (RD5.1E(3))	4.95 to 5.2V, 400mW	
Q47	Di, (1S953)		
R 1	CF, (ARD25T221J)	220 $\Omega$ , $\pm$ 5%, 1/4W	
R 2	CF, (ARD25T511J)	510 $\Omega$ , $\pm$ 5%, 1/4W	
R 3	CF, (ARD25T331J)	330 $\Omega$ , $\pm$ 5%, 1/4W	
R 4	CF, (ARD25T271J)	270 $\Omega$ , $\pm$ 5%, 1/4W	
R 5	CF, (ARD25T471J)	470 $\Omega$ , $\pm$ 5%, 1/4W	
R 6	CF, (ARD25T102J)	1k $\Omega$ , $\pm$ 5%, 1/4W	
R 7	Not assigned		
R 8	Not assigned		
R 9	Not assigned		
R10	CF, (ARD25T221J)	220 $\Omega$ , $\pm$ 5%, 1/4W	

( ): Manufacturer's part number  
\* : Selected at factory.

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Parts List : Z16-210 M/N PD

CKT REF	DESCRIPTION	RATING	NOTE
R11	Not assigned		
R12	Not assigned		
R13	Not assigned		
R14	Not assigned		
R15	Not assigned		
R16	Not assigned		
R17	Not assigned		
R18	Not assigned		
R19	CF, (ARD25T152J)	1.5k $\Omega$ , $\pm$ 5%, 1/4W	
R20	CF, (ARD25T102J)	1k $\Omega$ , $\pm$ 5%, 1/4W	
R21	CF, (ARD25T471J)	470 $\Omega$ , $\pm$ 5%, 1/4W	
R22	Not assigned		
R23	Not assigned		
R24	Not assigned		
R25	Not assigned		
R26	Not assigned		
R27	Not assigned		
R28	Not assigned		
R29	CF, (ARD25T183J)	18k $\Omega$ , $\pm$ 5%, 1/4W	
R30	CF, (ARD25T122J)	1.2k $\Omega$ , $\pm$ 5%, 1/4W	
R31	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm$ 5%, 1/4W	
R32	Not assigned		
R33	Not assigned		
R34	Not assigned		
R35	Not assigned		
R36	CF, (ARD25T152J)	1.5k $\Omega$ , $\pm$ 5%, 1/4W	
R37	Not assigned		
R38	Not assigned		
R39	Not assigned		
R40	CF, (ARD25T511J)	510 $\Omega$ , $\pm$ 5%, 1/4W	
R41	CF, (ARD25T152J)	1.5k $\Omega$ , $\pm$ 5%, 1/4W	
R42	Not assigned		
R43	Var, MF, (RJ-6P 1k $\Omega$ )	1k $\Omega$ , 1/2W	
R44	CF, (ARD25T331J)	330 $\Omega$ , $\pm$ 5%, 1/4W	
R45	CF, (ARD25T152J)	1.5k $\Omega$ , $\pm$ 5%, 1/4W	
R46	CF, (ARD25T102J)	1k $\Omega$ , $\pm$ 5%, 1/4W	
R47	CF, (ARD25T471J)	4.7 $\Omega$ , $\pm$ 5%, 1/4W	
R48	CF, (ARD25T511J)	510 $\Omega$ , $\pm$ 5%, 1/4W	
R49	CF, (ARD25T102J)	1k $\Omega$ , $\pm$ 5%, 1/4W	
R50	CF, (ARD25T511J)	510 $\Omega$ , $\pm$ 5%, 1/4W	
R51	CF, (ARD25T102J)	1k $\Omega$ , $\pm$ 5%, 1/4W	
R52	MF, (RN14K2E991D)	9.09k $\Omega$ , $\pm$ 0.5%, 1/4W	
R53	CF, (ARD25T223J)	22k $\Omega$ , $\pm$ 5%, 1/4W	
R54	CF, (ARD25T511J)	510 $\Omega$ , $\pm$ 5%, 1/4W	
R55	Not assigned		

( ): Manufacturer's part number  
\* : Selected at factory.

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Parts List : Z16-210 M/N PD

CKT REF	DESCRIPTION	RATING	NOTE
R56	Not assigned		
R57	Not assigned		
R58	MF, (RN14K2E6040D)	604 $\Omega$ , $\pm$ 0.5%, 1/4W	
R59	MF, (RN14K2E6040D)	604 $\Omega$ , $\pm$ 0.5%, 1/4W	
R60	MF, (RN14K2E1211D)	1.21k $\Omega$ , $\pm$ 0.5%, 1/4W	
R61	CF, (ARD25T223J)	22k $\Omega$ , $\pm$ 5%, 1/4W	
R62	CF, (ARD25T471J)	470 $\Omega$ , $\pm$ 5%, 1/4W	
R63	CF, (ARD25T103J)	10k $\Omega$ , $\pm$ 5%, 1/4W	
R64	Not assigned		
R65	Not assigned		
R66	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm$ 5%, 1/4W	
R67	Not assigned		
R68	Single in-line array (IHR-4-103JA)	10k $\Omega$ x 4, 1/8W	
R69	Not assigned		
R70	MF, (RS1FB102J)	10 $\Omega$ , $\pm$ 10%, 1W	
R71	CF, (ARD25T101J)	100 $\Omega$ , $\pm$ 5%, 1/4W	
R72	Not assigned		
R73	Not assigned		
R74	Not assigned		
R75	Not assigned		
R76	Not assigned		
R77	Not assigned		
R78	Not assigned		
R79	Not assigned		
R80	Not assigned		
R81	CF, (ARD25T103J)	10k $\Omega$ , $\pm$ 5%, 1/4W	
R82	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm$ 0.5%, 1/4W	
R83	CF, (ARD25T471J)	470 $\Omega$ , $\pm$ 5%, 1/4W	

( ): Manufacturer's part number  
\* : Selected at factory.

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Parts List : Z16-Z15 HPF

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CK1H0R5C)	0.5pF, ±0.25pF, 50V		
R 1	MF, (RM73B2B510JD)	51Ω, ±5%, 1/8W		
R 2	MF, (RM73B2B510JD)	51Ω, ±5%, 1/8W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List: Z18 μ 2nd CONVERTER 1

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CK45D1H472MY)	4700pF, ±20%, 50V		
C 2	Cer, (CK45D1H472MY)	4700pF, ±20%, 50V		
C 3	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
R 1	MF, (NRTF1/4C 22ΩJ)	22Ω, ±5%, 1/4W		
R 2	MF, (NRTF1/4C 330ΩJ)	330Ω, ±5%, 1/4W		
R 3	MF, (NRTF1/4C 330ΩJ)	330Ω, ±5%, 1/4W		
R 4	CF, (ARD25T820J)	82Ω, ±5%, 1/4W		
Z 1	231MT-1054A BPF			
Z 2	MC-5192			
Z 3	232MT-1040A BPF			

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z19 μ 2nd CONVERTER 2

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Not assigned			
C 3	Not assigned			
C 4	Not assigned			
C 5	Not assigned			
C 6	Cer, (CC732CH1H090D)	9pF, ±0.5pF, 50V		
C 7	Cer, (CC732CH1H150J)	15pF, ±5%, 50V		
C 8	Cer, (CC732CH1H090D)	9pF, ±0.5pF, 50V		
C 9	Var, Cer, (TZ03R300A)	5.2 to 30pF, 100V		
C10	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C11	Cer, (CC924CH1H510J)	51pF, ±5%, 50V		
C12	Cer, (RPE111CH161G50)	160pF, ±2%, 50V		
C13	Cer, (CC924CH1H620J)	62pF, ±5%, 50V		
C14	Cer, (CC45SH1H * JY)	22 to 390pF, ±5%, 50V		
C15	Cer, (CK45D1H103MY)	0.01μF, ±20%, 50V		
C16	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C17	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C18	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C19	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C20	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C21	Cer, (CK45D1H103MY)	0.01μF, ±20%, 50V		
C22	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C23	Cer, (CC45SH1H680JY)	68pF, ±5%, 50V		
C24	Not assigned			
C25	Not assigned			
C26	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
C27	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C28	Cer, (DSS310-55D223S)	0.022μF, +50/-20%, 50V		
C29	Elect, (CE04W1J1R0)	1μF, ±20%, 63V		
C30	Cer, (CK45D1H103MY)	0.01μF, ±20%, 50V		
C31	Not assigned			
C32	Not assigned			
C33	Not assigned			
C34	Cer, (CK45D1H103MY)	0.01μF, ±20%, 50V		
C35	Cer, (CK45D1H103MY)	0.01μF, ±20%, 50V		
C36	Elect, (CE04W1E101)	100μF, ±20%, 25V		
J 1	Not assigned			
J 2	Not assigned			
J 3	Connector, (27DP-LP-1.5QEW-AA)			
J 4	Connector, (27DP-LP-1.5QEW-AA)			
J 5	Not assigned			

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z19 μ 2nd CONVERTER 2

CKT REF	DESCRIPTION	RATING		NOTE
J 6	Connector, (DF1-8S-2.5R24)			
K 1	Relay, (NR-SD-12V)			
K 2	Relay, (NR-SD-12V)			
K 3	Relay, (NR-SD-12V)			
L 1	Not assigned			
L 2	Not assigned			
L 3	Not assigned			
L 4	Not assigned			
L 5	Coil, (SP0408-R15K)	0.15..H		
L 6	Coil, (SP0408-R33K)	0.33..H		
L 7	Coil, (SP0408-R10M)	0.1..H		
L 8	Coil, (SP0408-R68K)	0.68..H		
L 9	Coil, (SP0408-R68K)	6.8..H		
L10	Coil, (SP0408-R68K)	6.8..H		
L11	Coil, (SP0408-R68K)	6.8..H		
L12	Coil, (SP0408-R33K)	3.3..H		
L13	Coil, (LP8-100K)	10..H		
Q 1	Tr, (2SC2369)			
Q 2	Tr, (2SA1206)			
Q 3	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q 4	Di, (1SV34)			
Q 5	Tr, (2SC2369)			
Q 6	Tr, (2SA1206)			
Q 7	Di, (1SV34)			
Q 8	Not assigned			
Q 9	Tr, (DTC143EF)			
Q10	Tr, (DTC143EF)			
Q11	Tr, (DTC143EF)			
Q12	Di, (1S953)			
Q13	Di, (1S953)			
Q14	Di, (1S953)			
R 1	Not assigned			
R 2	Not assigned			
R 3	Not assigned			
R 4	Not assigned			
R 5	MF, (NRTF1/4C 22 J)	22, ±5%, 1/4W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z19 2nd CONVERTER 2

CKT REF	DESCRIPTION	RATING	NOTE
R 6	MF, (NRTF1/4C 3300J)	3300, ±5%, 1/4W	
R 7	MF, (NRTF1/4C 3300J)	3300, ±5%, 1/4W	
R 8	MF, (NRTF1/4C 5000J)	5000, ±5%, 1/4W	
R 9	CF, (ARD25T470J)	470, ±5%, 1/4W	
R10	CF, (ARD25T470J)	470, ±5%, 1/4W	
R11	CF, (ARD25T472J)	4.7k, ±5%, 1/4W	
R12	CF, (ARD25T102J)	1k, ±5%, 1/4W	
R13	CF, (ARD25T331J)	3300, ±5%, 1/4W	
R14	CF, (ARD25T682J)	6.8k, ±5%, 1/4W	
R15	CF, (ARD25T682J)	6.2k, ±5%, 1/4W	
R16	CF, (ARD25T471J)	470, ±5%, 1/4W	
R17	CF, (ARD25T222J)	2.2k, ±5%, 1/4W	
R18	Not assigned		
R19	CF, (ARD25T471J)	470, ±5%, 1/4W	
R20	CF, (ARD25T151J)	150, ±5%, 1/4W	
R21	CF, (ARD25T221J)	220, ±5%, 1/4W	
R22	CF, (ARD25T102J)	1k, ±5%, 1/4W	
R23	CF, (ARD25T102J)	1k, ±5%, 1/4W	
R24	CF, (ARD25T470J)	470, ±5%, 1/4W	
R25	Not assigned		
R26	Not assigned		
R27	CF, (ARD25T153J)	15k, ±5%, 1/4W	
R28	CF, (ARD25T153J)	15k, ±5%, 1/4W	
R29	Not assigned		
R30	CF, (ARD25T153J)	15k, ±5%, 1/4W	
R31	Var, MF, (RJ-6S 50k)	50k, 1/2W	
R32	CF, (ARD25T153J)	15k, ±5%, 1/4W	
Z 1	Not assigned		
Z 2	Not assigned		
Z 3	Not assigned		
Z 4	MIXER, (M-3)		

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Elect, (CE04W1E470)	470F, ±20%, 25V	
C 2	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C 3	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C 4	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C 5	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C 6	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C 7	Cer, (CK924C1H100D)	10pF, ±0.5pF, 50V	
C 8	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C 9	Cer, (CK924C1H360J)	36pF, ±5%, 50V	
C10	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C11	Elect, (CE04W1E470)	470F, ±20%, 25V	
C12	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C13	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C14	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C15	Cer, (CK924C1H222M)	2200pF, ±20%, 50V	
C16	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C17	Elect, (CE04W1E470)	470F, ±20%, 25V	
C18	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C19	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C20	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C21	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C22	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C23	Not assigned		
C24	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C25	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C26	Cer, (CK924C1H104M)	0.1uF, ±20%, 50V	
C27	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C28	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C29	Elect, (CE04W1A101)	100uF, ±20%, 10V	
C30	Not assigned		
C31	Cer, (RPE111CH471G50)	470pF, ±2%, 50V	
C32	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C33	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C34	Not assigned		
C35	Cer, (CK924C1H221J)	220pF, ±5%, 50V	
C36	Cer, (CK924C1H221J)	220pF, ±5%, 50V	
C37	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C38	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C39	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C40	Not assigned		
C41	Tant, (CS-E1C3R3M)	3.3uF, ±20%, 16V	
C42	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C43	Not assigned		
C44	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C45	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
C46	Not assigned		
C47	Not assigned		
C48	Plast, (ECQ-MH103KZ)	0.01uF, ±10%, 50V	
C49	Plast, (ECQ-MH103KZ)	0.01uF, ±10%, 50V	
C50	Tant, (CS-E1C3R3M)	3.3uF, ±20%, 16V	
C51	M Plast, (CF922N2A104K)	0.1uF, ±10%, 100V	
C52	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C53	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C54	Not assigned		
C55	Not assigned		
C56	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C57	Cer, (CK924C1H101J)	100pF, ±5%, 50V	
C58	Not assigned		
C59	Not assigned		
C60	Elect, (CE04W1E470)	470F, ±20%, 25V	
C61	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C62	Not assigned		
C63	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C64	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C65	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C66	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C67	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C68	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C69	Elect, (CE04W1E101)	100uF, ±20%, 25V	
C70	Not assigned		
C71	Not assigned		
C72	Not assigned		
C73	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C74	Elect, (CE04W1E470)	470F, ±20%, 25V	
C75	Not assigned		
C76	Plast, (ECQ-MH103KZ)	0.01uF, ±10%, 50V	
C77	Elect, (CA92C-1C-1R000-R53)	1uF, ±20%, 16V	
C78	Cer, (CC45CH1H101JY)	100pF, ±5%, 50V	
C79	Cer, (CC45CH1H150JY)	15pF, ±5%, 50V	
C80	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C81	Cer, (CK924C1H104M)	0.1uF, ±20%, 50V	
C82	Cer, (CK924C1H104M)	0.1uF, ±20%, 50V	
C83	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C84	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C85	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C86	Cer, (CK924C1H102M)	1000pF, ±20%, 50V	
C87	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C88	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
C89	Elect, (CE04W1E470)	470F, ±20%, 25V	
C90	Elect, (CE04W1E470)	470F, ±20%, 25V	
C91	Elect, (CE04W1A101)	100uF, ±20%, 10V	
C92	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C93	Not assigned		
C94	Not assigned		
C95	Not assigned		
C96	Elect, (CE04W1E101)	100uF, ±20%, 25V	
C97	Elect, (CE04W1E101)	100uF, ±20%, 25V	
C98	Elect, (CA92C-1C-1R000-R53)	1uF, ±20%, 16V	
C99	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C100	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C101	Elect, (CA92C-1C-1R000-R53)	1uF, ±20%, 16V	
C102	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C103	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C104	M Plast, (CF922N2A105K)	1uF, ±10%, 100V	
C105	M Plast, (CF922N2A225K)	2.2uF, ±10%, 100V	
C106	Cer, (CK924C1H220J)	22pF, ±5%, 50V	
C107	Cer, (CK924F1H104Z)	0.1uF, ±80/-20%, 50V	
C108	Cer, (CK924F1H04Z)	0.1uF, ±80/-20%, 50V	
J 1	Connector, (27DP-LP-1.5)		
J 2	Connector, (27DP-LR-PC)		
J 3	Connector, (PI011-12M)	12 pins	
J 4	Connector, (PI011-02F)	2 pins	
J 5	Not assigned		
J 6	Connector, (HIF3-26P-2.54DS)	26 pins	
J 7	Connector, (DF1-8P-2.54DSA)	8 pins	
J 8	Connector, (DF1-5P-2.54DSA)	5 pins	
J 9	Connector, (HIF3-34P-2.54DS)	34 pins	
K 1	Relay, (NR-SD-12V)		
L 1	Coil, (44L46006C)	86 nH	
L 3	Coil, (34L52688B)	18 nH	
L 3	Coil, (LF8-100K)	100 nH	
L 4	Coil, (LF8-101K)	100 nH	
L 5	Not assigned		

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
L 6	Not assigned		
L 7	Coil, (LF8-221K)	220 $\mu$ H	
L 8	Coil, (LF8-221K)	220 $\mu$ H	
L 9	Not assigned		
L10	Not assigned		
L11	Coil, (LH1-471K)	470 $\mu$ H	
L12	Coil, (LH1-471K)	470 $\mu$ H	
L13	Coil, (LH1-471K)	470 $\mu$ H	
Q 1	FET, (2SK55E)		
Q 2	FET, (2SK55E)		
Q 3	Di, (1SV50)		
Q 4	Di, (1SV50)		
Q 5	Tr, (2SC2369)		
Q 6	Tr, (2SC2369)		
Q 7	Tr, (2SC2369)		
Q 8	Di, (1S953)		
Q 9	IC, (MC10H131L)		
Q10	Di, (1S953)		
Q11	Tr, (2SC2570A)		
Q12	IC, (SN74AS161N)		
Q13	Tr, (2SC2368)		
Q14	IC, (DTC143EF)		
Q15	Di, (1S953)		
Q16	IC, (74LS293)		
Q17	IC, (74121)		
Q18	Tr, (2SC2901)		
Q19	Tr, (2SC2901)		
Q20	Tr, (2SC1844)		
Q21	IC, (NE5532A)		
Q22	IC, ( $\mu$ PC258C)		
Q23	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q24	Di, breakdown, (RD13EB)	12.4 to 14.1V, 400mW	
Q25	IC, ( $\mu$ PC14312H)		
Q26	IC, ( $\mu$ PC16312H)		
Q27	IC, ( $\mu$ PC14308H)		
Q28	Di, breakdown, (RD5.1E(3))	4.95 to 5.2V, 400mW	
Q29	Di, (1S953)		
Q30	Tr, (2SC2721)		
Q31	Di, breakdown, (1S252)	5.9 to 6.5V, 400mW	
Q32	IC, ( $\mu$ PC454D)		
Q33	IC, ( $\mu$ PC648D)		
Q34	IC, (TC4042BP)		
Q35	IC, (TC40H374P)		

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
Q36	IC, (TC4042BP)		
Q37	IC, (TC40H374P)		
Q38	IC, (TC40H374P)		
Q39	Not assigned		
Q40	IC, ( $\mu$ PC258C)		
Q41	IC, ( $\mu$ PC648D)		
Q42	IC, ( $\mu$ PC258C)		
Q43	IC, (HA17408P)		
Q44	IC, (74LS00)		
Q45	IC, ( $\mu$ PD7011C)		
Q46	IC, (TC40H374P)		
Q47	IC, (MX7530JN)		
Q48	Di, (1S953)		
Q49	IC, ( $\mu$ PC258C)		
Q50	IC, (TC4053BP)		
Q51	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q52	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q53	IC, (TC4052BP)		
Q54	IC, (TC4053BP)		
Q55	IC, ( $\mu$ PC454D)		
Q56	IC, ( $\mu$ PC803C)		
Q57	IC, ( $\mu$ PC258C)		
Q58	IC, (TC4011BP)		
Q59	IC, (NJU201AD)		
Q60	Not assigned		
Q61	IC, ( $\mu$ PC1093J)		
Q62	Not assigned		
Q63	Not assigned		
Q64	IC, (TC4052BP)		
Q65	IC, ( $\mu$ PC258C)		
Q66	Tr, (2SC2718)		
Q67	IC, (TC40H374P)		
Q68	IC, (TC40H374P)		
Q69	IC, (TC40H174P)		
Q70	IC, (TC40H374P)		
Q71	IC, ( $\mu$ PD7011C)		
Q72	IC, (NE5532A)		
Q73	Di, breakdown, (RD3.9EB)	3.7 to 4.1V, 400mW	
Q74	Not assigned		
Q75	IC, (TC4052BP)		
Q76	IC, (NE5532A)		
Q77	Not assigned		
Q78	IC, (TC40H374P)		
Q79	IC, (TC40H138P)		
Q80	Not assigned		

M-1

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
Q81	IC, ( $\mu$ PC14312H)		
Q82	IC, ( $\mu$ PC78L05)		
Q83	IC, ( $\mu$ PC16312H)		
Q84	IC, (LM79L05AC2)		
Q85	Not assigned		
Q86	Not assigned		
Q87	Not assigned		
Q88	IC, (TC40H138P)		
Q89	IC, ( $\mu$ PC454D)		
Q90	Not assigned		
Q91	Not assigned		
Q92	Not assigned		
Q93	Tr, (2SC2718)		
Q94	Not assigned		
R 1	CF, (ARD25T103J)	10k $\pm$ 5%, 1/4W	
R 2	CF, (ARD25T122J)	1.2k $\pm$ 5%, 1/4W	
R 3	CF, (ARD25T272J)	2.7k $\pm$ 5%, 1/4W	
R 4	CF, (ARD25T152J)	1.5k $\pm$ 5%, 1/4W	
R 5	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R 6	CF, (ARD25T562J)	5.6k $\pm$ 5%, 1/4W	
R 7	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R 8	CF, (ARD25T150J)	15 $\pm$ 5%, 1/4W	
R 9	MF, (RN14K2E1211D)	1.21k $\pm$ 0.5%, 1/4W	
R10	MF, (RN14K2E1011D)	2.10k $\pm$ 0.5%, 1/4W	
R11	CF, (ARD25T330J)	33 $\pm$ 5%, 1/4W	
R12	CF, (ARD25T330J)	33 $\pm$ 5%, 1/4W	
R13	CF, (ARD25T182J)	1.8k $\pm$ 5%, 1/4W	
R14	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R15	CF, (ARD25T472J)	4.7k $\pm$ 5%, 1/4W	
R16	CF, (ARD25T680J)	68 $\pm$ 5%, 1/4W	
R17	CF, (ARD25T750J)	750 $\pm$ 5%, 1/4W	
R18	CF, (ARD25T680J)	68 $\pm$ 5%, 1/4W	
R19	CF, (ARD25T101J)	100 $\pm$ 5%, 1/4W	
R20	CF, (ARD25T151J)	150 $\pm$ 5%, 1/4W	
R21	CF, (ARD25T680J)	68 $\pm$ 5%, 1/4W	
R22	CF, (ARD25T681J)	680 $\pm$ 5%, 1/4W	
R23	CF, (ARD25T151J)	150 $\pm$ 5%, 1/4W	
R24	CF, (ARD25T102J)	1.0k $\pm$ 5%, 1/4W	
R25	CF, (ARD25T511J)	510 $\pm$ 5%, 1/4W	
R26	CF, (ARD25T511J)	510 $\pm$ 5%, 1/4W	
R27	CF, (ARD25T511J)	510 $\pm$ 5%, 1/4W	
R28	CF, (ARD25T511J)	510 $\pm$ 5%, 1/4W	

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
R29	CF, (ARD25T221J)	220 $\pm$ 5%, 1/4W	
R30	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R31	CF, (ARD25T331J)	330 $\pm$ 5%, 1/4W	
R32	CF, (ARD25T682J)	6.8k $\pm$ 5%, 1/4W	
R33	CF, (ARD25T681J)	680 $\pm$ 5%, 1/4W	
R34	CF, (ARD25T682J)	6.8k $\pm$ 5%, 1/4W	
R35	MF, (RN14K2E5111D)	5.11k $\pm$ 0.5%, 1/4W	
R36	CF, (ARD25T102J)	1.0k $\pm$ 5%, 1/4W	
R37	CF, (ARD25T102J)	1.0k $\pm$ 5%, 1/4W	
R38	CF, (ARD25T103J)	10k $\pm$ 5%, 1/4W	
R39	CF, (ARD25T223J)	22k $\pm$ 5%, 1/4W	
R40	CF, (ARD25T103J)	10k $\pm$ 5%, 1/4W	
R41	CF, (ARD25T223J)	22k $\pm$ 5%, 1/4W	
R42	MF, (RN14K2E3011D)	3.01k $\pm$ 0.5%, 1/4W	
R43	MF, (RN14K2E3011D)	3.01k $\pm$ 0.5%, 1/4W	
R44	CF, (ARD25T102J)	1.0k $\pm$ 5%, 1/4W	
R45	MF, (RN14K2E1501D)	1.50k $\pm$ 0.5%, 1/4W	
R46	MF, (RN14K2E3401D)	3.40k $\pm$ 0.5%, 1/4W	
R47	MF, (RN14K2E3401D)	3.40k $\pm$ 0.5%, 1/4W	
R48	CF, (ARD25T392J)	3.9k $\pm$ 5%, 1/4W	
R49	CF, (ARD25T102J)	1.0k $\pm$ 5%, 1/4W	
R50	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R51	MF, (RN14K2E1001D)	1.0k $\pm$ 0.5%, 1/4W	
R52	MF, (RN14K2E1001D)	1.0k $\pm$ 0.5%, 1/4W	
R53	MF, (RN14K2E1782D)	17.8k $\pm$ 0.5%, 1/4W	
R54	MF, (RN14K2E1782D)	17.8k $\pm$ 0.5%, 1/4W	
R55	MF, (RN14K2E4021D)	4.02k $\pm$ 0.5%, 1/4W	
R56	MF, (RN14K2E4021D)	4.02k $\pm$ 0.5%, 1/4W	
R57	CF, (ARD25T152J)	1.5k $\pm$ 5%, 1/4W	
R58	CF, (ARD25T152J)	1.5k $\pm$ 5%, 1/4W	
R59	CF, (ARD25T681J)	680 $\pm$ 5%, 1/4W	
R60	MF, (RN14K2E2492D)	24.9k $\pm$ 0.5%, 1/4W	
R61	Var, MF, (RJ-6S 1k)	1.0k, 1/2W	
R62	MF, (RN14K2E2611D)	2.61k $\pm$ 0.5%, 1/4W	
R63	CF, (ARD25T102J)	1.0k $\pm$ 5%, 1/4W	
R64	CF, (ARD25T101J)	100 $\pm$ 5%, 1/4W	
R65	CF, (ARD25T101J)	100 $\pm$ 5%, 1/4W	
R66	Var, MF, (RJ-6S 200)	200, 1/2W	
R67	MF, (RN14K2E7680D)	7680 $\pm$ 0.5%, 1/4W	
R68	MF, (RN14K2E1001D)	1.0k $\pm$ 0.5%, 1/4W	
R69	Var, MF, (RJ-6S 1k)	1k, 1/2W	
R70	MF, (RN14K2E6811D)	6.81k $\pm$ 0.5%, 1/4W	
R71	CF, (ARD25T472J)	4.7k $\pm$ 5%, 1/4W	
R72	CF, (ARD25T472J)	4.7k $\pm$ 5%, 1/4W	
R73	MF, (RN14K2E6811D)	6.81k $\pm$ 0.5%, 1/4W	

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
R74	MF, (RN14K2E6811D)	6.81k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R75	MF, (RN14K2E6190D)	619 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R76	MF, (RN14K2E2551D)	2.55k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R77	CF, (ARD25T221J)	220 $\Omega$ , $\pm 5\%$ , 1/4W	
R78	CF, (ARD25T152J)	1.5k $\Omega$ , $\pm 5\%$ , 1/4W	
R79	Var, MF, (RJ-6S 1k $\Omega$ )	1.0k $\Omega$ , 1/2W	
R80	Not assigned		
R81	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W	
R82	MF, (RN14K2E10R0D)	10.0 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R83	MF, (RS1FB22, J)	22 $\Omega$ , $\pm 5\%$ , 1W	
R84	MF, (RN14K2E7680D)	768 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R85	Var, MF, (RJ-6P 1k $\Omega$ )	1.0k $\Omega$ , 1/2W	
R86	MF, (RN14K2E5491D)	5.49k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R87	MF, (RN14K2E6041D)	6.04k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R88	CF, (ARD25T180J)	18 $\Omega$ , $\pm 5\%$ , 1/4W	
R89	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R90	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R91	Var, MF, (RJ-6P 200 $\Omega$ )	200 $\Omega$ , 1/2W	
R92	MF, (RN14K2E3011D)	3.01k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R93	MF, (RN14K2E6041D)	6.04k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R94	MF, (RN14K2E6041D)	6.04k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R95	Not assigned		
R96	Not assigned		
R97	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R98	MF, (RN14K2E1151D)	1.15k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R99	Not assigned		
R100	Not assigned		
R101	MF, (RN14K2E4992D)	49.9k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R102	MF, (RN14K2E1000D)	100 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R103	Not assigned		
R104	MF, (RN14K2E2491D)	2.49k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R105	MF, (RN14K2E2491D)	2.49k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R106	Not assigned		
R107	Not assigned		
R108	Not assigned		
R109	Not assigned		
R110	Not assigned		
R111	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W	
R112	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R113	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R114	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R115	MF, (RN14K2E5490D)	549 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R116	MF, (RN14K2E1272D)	12.7k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R117	MF, (RN14K2E4421D)	4.42k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R118	MF, (RN14K2E2211D)	2.21k $\Omega$ , $\pm 0.5\%$ , 1/4W	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
R119	MF, (RN14K2E2211D)	2.21k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R120	MF, (RN14K2E4421D)	4.42k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R121	MF, (RN14K2E2211D)	2.21k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R122	Not assigned		
R123	Not assigned		
R124	Not assigned		
R125	MF, (RN14K2E6041D)	6.04k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R126	Var, MF, (RJ-6S 1k $\Omega$ )	1.0k $\Omega$ , 1/2W	
R127	MF, (RN14K2E1152D)	11.5k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R128	Var, MF, (RJ-6P 1k $\Omega$ )	1.0k $\Omega$ , 1/2W	
R129	MF, (RN14K2E8661D)	8.66k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R130	Not assigned		
R131	Not assigned		
R132	Not assigned		
R133	MF, (RN14K2E6041D)	6.04k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R134	MF, (RN14K2E5901D)	5.90k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R135	MF, (RN14K2E30R1D)	30.1 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R136	Not assigned		
R137	MF, (RN14K2E3011D)	3.01k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R138	MF, (RN14K2E1101D)	1.10k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R139	MF, (RN14K2E3742D)	37.4k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R140	MF, (RN14K2E3742D)	37.4k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R141	MF, (RN14K2E3742D)	37.4k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R142	MF, (RN14K2E3742D)	37.4k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R143	Var, MF, (RJ-6S 50k $\Omega$ )	50k $\Omega$ , 1/2W	
R144	MF, (RN14K2E2003D)	200k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R145	MF, (RN14K2E7151D)	7.15k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R146	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R147	Var, MF, (RJ-6S 50k $\Omega$ )	50k $\Omega$ , 1/2W	
R148	Not assigned		
R149	Var, MF, (RJ-6S 50k $\Omega$ )	50k $\Omega$ , 1/2W	
R150	Not assigned		
R151	Var, MF, (RJ-6S 50k $\Omega$ )	50k $\Omega$ , 1/2W	
R152	Not assigned		
R153	Var, MF, (RJ-6S 50k $\Omega$ )	50k $\Omega$ , 1/2W	
R154	Not assigned		
R155	CF, (ARD25T * J)	33k to 220k, $\pm 5\%$ , 1/4W	*
R156	Not assigned		
R157	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R158	Not assigned		
R159	CF, (ARD25T * J)	1 $\Omega$ to 47k $\Omega$ , $\pm 5\%$ , 1/4W	Q'ty 0 or 1, *
R160	Not assigned		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
R161	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W	
R162	Not assigned		
R163	Not assigned		
R164	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R165	Var, MF, (RJ-6S 20k $\Omega$ )	20k $\Omega$ , 1/2W	
R166	Var, MF, (RJ-6S 50k $\Omega$ )	50k $\Omega$ , 1/2W	
R167	Var, MF, (RJ-6S 50k $\Omega$ )	50k $\Omega$ , 1/2W	
R168	Var, MF, (RJ-6S 20k $\Omega$ )	20k $\Omega$ , 1/2W	
R169	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W	
R170	CF, (ARD25T473J)	47k $\Omega$ , $\pm 5\%$ , 1/4W	
R171	CF, (ARD25T * J)	22k to 1M, $\pm 5\%$ , 1/4W	Q'ty 0 or 1, *
R172	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R173	Var, MF, (RJ-6S 1k $\Omega$ )	1.0k $\Omega$ , 1/2W	
R174	Var, MF, (RJ-6S 100k $\Omega$ )	100k $\Omega$ , 1/2W	
R175	CF, (ARD25T224J)	220k $\Omega$ , $\pm 5\%$ , 1/4W	
R176	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R177	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R178	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R179	MF, (RN14K2E4990D)	499 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R180	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W	
R181	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W	
R182	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R183	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R184	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R185	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R186	MF, (RN14K2E4990D)	499 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R187	Not assigned		
R188	Not assigned		
R189	Not assigned		
R190	Not assigned		
R191	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W	
R192	Var, MF, (RJ-6S 10k $\Omega$ )	10k $\Omega$ , 1/2W	
R193	Var, MF, (RJ-6S 10k $\Omega$ )	10k $\Omega$ , 1/2W	
R194	Var, MF, (RJ-6S 10k $\Omega$ )	10k $\Omega$ , 1/2W	
R195	Var, MF, (RJ-6S 2k $\Omega$ )	2k $\Omega$ , 1/2W	
R196	Not assigned		
R197	Not assigned		
R198	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm 5\%$ , 1/4W	
R199	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W	
R200	Not assigned		
R201	MF, (RN14K2E1001D)	1.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R202	MF, (RN14K2E3011D)	3.01k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R203	Not assigned		
R204	Not assigned		
R205	Not assigned		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING	NOTE
R206	Single in-line array, (IHR-8-472JA)	4.7k $\Omega$ x 8, 1/8W	
R207	Single in-line array, (IHR-4-472JA)	4.7k $\Omega$ x 4, 1/8W	
R208	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W	
R209	Single in-line array, (IHR-4-472JA)	4.7k $\Omega$ x 4, 1/8W	
R210	Not assigned		
R211	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W	
R212	CF, (ARD25T221J)	22 $\Omega$ , $\pm 5\%$ , 1/4W	
R213	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W	
R214	CF, (ARD25T391J)	390 $\Omega$ , $\pm 5\%$ , 1/4W	
R215	Not assigned		
R216	Not assigned		
R217	CF, (ARD25T220J)	22 $\Omega$ , $\pm 5\%$ , 1/4W	
R218	Not assigned		
R219	Not assigned		
R220	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W	
R221	Signal in-line array, (RRS-6-472JB)	4.7k $\Omega$ x 6, 1/8W	
R222	Var, MF, (RJ-6P100k $\Omega$ )	100k $\Omega$ , 1/2W	
R223	MF, (RN14K2E1132D)	11.3k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R224	Not assigned		
R225	Not assigned		
R226	Not assigned		
R227	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W	
R228	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W	
R229	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R230	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W	
R231	Not assigned		
R232	Not assigned		
R233	Not assigned		
R234	Not assigned		
R235	CF, (ARD25T470J)	47 $\Omega$ , $\pm 5\%$ , 1/4W	
R236	CF, (ARD25T472J)	4.7 $\Omega$ , $\pm 5\%$ , 1/4W	
R237	Not assigned		
R238	Not assigned		
R239	Not assigned		
R240	Single in-line array, (RRS-4-332JB)	3.3k $\Omega$ x 4, 1/8W	
R241	Var, MF, (RJ-6P100k $\Omega$ )	100k $\Omega$ , 1/2W	
R242	MF, (RN14K2E1212D)	12.1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R243	Single in-line array, (RRS-4-472JB)	4.7k $\Omega$ x 4, 1/8W	
R244	Single in-line array, (RRS-4-472JB)	4.7k $\Omega$ x 4, 1/8W	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CC924CH1H910J)	91pF, ±5%, 50V	
C 2	Cer, (CC924CH1H910J)	91pF, ±5%, 50V	
C 3	Cer, (CC924CH1H910J)	91pF, ±5%, 50V	
C 4	Cer, (CC924CH1H910J)	91pF, ±5%, 50V	
C 5	Not assigned		
C 6	Not assigned		
C 7	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C 8	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C 9	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C10	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C11	Cer, (CK924C1H104M)	0.01μF, ±20%, 50V	
C12	Cer, (CC45CH1H470JY)	47pF, ±5%, 50V	
C13	Not assigned		
C14	Not assigned		
C15	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C16	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C17	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C18	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C19	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C20	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C21	Cer, (CC45SH1H150JY)	15pF, ±5%, 50V	
C22	Cer, (CC45SH1H270JY)	27pF, ±5%, 50V	
C23	Var, Cer, (T203T200E)	4.2 to 20pF, 100V	
C24	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C25	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C26	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C27	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C28	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C29	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C30	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C31	Cer, (CC45SH1H150JY)	15pF, ±5%, 50V	
C32	Cer, (CC45SH1H270JY)	27pF, ±5%, 50V	
C33	Var, Cer, (T203T200E)	4.2 to 20pF, 100V	
C34	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C35	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C36	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C37	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C38	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C39	Not assigned		
C40	Not assigned		
C41	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C42	Cer, (CC45CK1H010CY)	1pF, ±0.25pF, 50V	Q'ty 0 or 1
C43	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C44	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C45	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING	NOTE
C46	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C47	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C48	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C49	Cer, (CC45CH1H050CY)	5pF, ±0.25pF, 50V	
C50	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C51	Var, Cer, (T203T200E)	4.2 to 20pF, 100V	
C52	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C53	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C54	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C55	Not assigned		
C56	Not assigned		
C57	Not assigned		
C58	Not assigned		
C59	Not assigned		
C60	Not assigned		
C61	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C62	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C63	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C64	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C65	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C66	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C67	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C68	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C69	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C70	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C71	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C72	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C73	Not assigned		
C74	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C75	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C76	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C77	Not assigned		
C78	Not assigned		
C79	Not assigned		
C80	Not assigned		
C81	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C82	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C83	Cer, (CK924C1H223M)	0.022μF, ±20%, 50V	
C84	Var, Cer, (T203T200E)	6 to 50pF, 100V	
C85	Cer, (CC45UJ1H220JY)	22pF, ±5%, 50V	
C86	Cer, (RPE111CH331G50)	330pF, ±2%, 50V	
C87	Cer, (CC45SH1H101JY)	100pF, ±5%, 50V	
C88	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C89	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C90	Not assigned		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING	NOTE
C91	Cer, (CK924C1H223M)	0.022μF, ±20%, 50V	
C92	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C93	Cer, (CK924C1H223M)	0.022μF, ±20%, 50V	
C94	Var, Cer, (T203T200E)	6 to 50pF, 100V	
C95	Cer, (CC45UJ1H220JY)	22pF, ±5%, 50V	
C96	Cer, (RPE111CH331G50)	330pF, ±2%, 50V	
C97	Cer, (CC45SH1H101JY)	100pF, ±5%, 50V	
C98	Cer, (CK924C1H223M)	0.022μF, ±20%, 50V	
C99	Not assigned		
C100	Not assigned		
C101	Not assigned		
C102	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C103	Cer, (CK924C1H223M)	0.022μF, ±20%, 50V	
C104	Var, Cer, (T203T200E)	6 to 50pF, 100V	
C105	Cer, (CC45UJ1H220JY)	22pF, ±5%, 50V	
C106	Cer, (RPE111CH331G50)	330pF, ±2%, 50V	
C107	Cer, (CC45SH1H101JY)	100pF, ±5%, 50V	
C108	Cer, (CK924C1H223M)	0.022μF, ±20%, 50V	
C109	Cer, (CK924C1H104M)	0.1μF, ±20%, 50V	
C110	Not assigned		
C111	Not assigned		
C112	Not assigned		
C113	Not assigned		
C114	Not assigned		
C115	Not assigned		
C116	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C117	Not assigned		
C118	Not assigned		
C119	Not assigned		
C120	Not assigned		
C121	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C122	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C123	Cer, (CK924C1H223M)	0.022μF, ±20%, 50V	
C124	Not assigned		
C125	Not assigned		
C126	Not assigned		
C127	Not assigned		
C128	Not assigned		
C129	Not assigned		
C130	Not assigned		
C131	Not assigned		
C132	Not assigned		
C133	Var, Cer, (T203T200E)	4.2 to 20pF, 100V	
C134	Not assigned		
C135	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING	NOTE
C136	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C137	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C138	Not assigned		
C139	Not assigned		
C140	Not assigned		
C141	Not assigned		
C142	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C143	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C144	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C145	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C146	Not assigned		
C147	Not assigned		
C148	Not assigned		
C149	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C150	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	
C151	Not assigned		
C152	Not assigned		
C153	Not assigned		
C154	Not assigned		
C155	Not assigned		
C156	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C157	Cer, (CK924C1H104M)	0.1μF, ±20%, 50V	Q'ty 0 or 1
C158	Not assigned		
C159	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C160	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C161	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C162	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C163	Cer, (CC45CK1H010CY)	1pF, ±0.25pF, 50V	Q'ty 0 or 1
C164	Not assigned		
C165	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C166	Cer, (CK924C1H104M)	0.1μF, ±20%, 50V	Q'ty 0 or 1
C167	Not assigned		
C168	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C169	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C170	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C171	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C172	Cer, (CC45CK1H010CY)	1pF, ±0.25pF, 50V	
C173	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C174	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C175	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V	
C176	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C177	Cer, (CC45SH1H150JY)	15pF, ±5%, 50V	
C178	Cer, (CC45SH1H270JY)	27pF, ±5%, 50V	
C179	Var, Cer, (T203T200E)	4.2 to 20pF, 100V	
C180	Cer, (CK924F1H104Z)	0.1μF, ±80/-20%, 50V	

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CKT REF	DESCRIPTION	RATING	NOTE
C181	Cer, (CK924CIH103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C182	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C183	Not assigned		
C184	Cer, (CK45B1H102KY)	1000pF, $\pm$ 10%, 50V	
C185	Cer, (CK45B1H102KY)	1000pF, $\pm$ 10%, 50V	
C186	Cer, (CK924CIH103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C187	Cer, (CK924CIH103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C188	Cer, (CC45SH1H150JY)	15pF, $\pm$ 5%, 50V	
C189	Cer, (CC45SH1H270JY)	27pF, $\pm$ 5%, 50V	
C190	Var, Cer, (TZ03T200E)	4.2 to 20pF, 100V	
C191	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C192	Cer, (CK924CIH103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C193	Not assigned		
C194	Not assigned		
C195	Not assigned		
C196	Cer, (CK45B1H102KY)	1000pF, $\pm$ 10%, 50V	
C197	Cer, (CK45B1H102KY)	1000pF, $\pm$ 10%, 50V	
C198	Cer, (CK924CIH103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C199	Cer, (CK924CIH103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C200	Cer, (CC45SH1H150JY)	15pF, $\pm$ 5%, 50V	
C201	Cer, (CC45SH1H270JY)	27pF, $\pm$ 5%, 50V	
C202	Var, Cer, (TZ03T200E)	4.2 to 20pF, 100V	
C203	Cer, (CK924CIH103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C204	Cer, (CK924CIH103M)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C205	Cer, (CK45B1H102KY)	1000pF, $\pm$ 10%, 50V	
C206	Cer, (CK45B1H102KY)	1000pF, $\pm$ 10%, 50V	
C207	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C208	Not assigned		
C209	Not assigned		
C210	Not assigned		
C211	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C212	Not assigned		
C213	Not assigned		
C214	Not assigned		
C215	Not assigned		
C216	Not assigned		
C217	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C218	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C219	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C220	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C221	Not assigned		
C222	Not assigned		
C223	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	
C224	Elect, (CE04W1A101)	100pF, $\pm$ 20%, 10V	
C225	Cer, (CK924FIH104Z)	0.1 $\mu$ F, $\pm$ 80/-20%, 50V	

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CKT REF	DESCRIPTION	RATING	NOTE
C226	Elect, (CE04W1A101)	100 $\mu$ F, $\pm$ 20%, 10V	
C227	Elect, (CE04W1E470)	47 $\mu$ F, $\pm$ 20%, 25V	
C228	Elect, (CE04W1E470)	47 $\mu$ F, $\pm$ 20%, 25V	
C229	Not assigned		
C230	Not assigned		
C231	Cer, (CK924CIH223M)	0.022 $\mu$ F, $\pm$ 20%, 50V	
C232	Cer, (CC45CH1H330JY)	33pF, $\pm$ 5%, 50V	
C233	Not assigned		
C234	Not assigned		
C235	Cer, (CK924CIH473M)	0.047 $\mu$ F, $\pm$ 20%, 50V	
C236	Cer, (CK924CIH473M)	0.047 $\mu$ F, $\pm$ 20%, 50V	
C237	Not assigned		
C238	Not assigned		
C239	Not assigned		
C240	Not assigned		
C241	Cer, (CK924CIH104M)	0.1 $\mu$ F, $\pm$ 20%, 50V	
C242	Cer, (CK924CIH104M)	0.1 $\mu$ F, $\pm$ 20%, 50V	
C243	Cer, (CK924CIH104M)	0.1 $\mu$ F, $\pm$ 20%, 50V	
C244	Cer, (CK924CIH104M)	0.1 $\mu$ F, $\pm$ 20%, 50V	
J 1	Connector, (Z7DP-LR-PC)		
J 2	Not assigned		
J 3	Connector, (Z7DP-LP-1.5W-201)		
J 4	Connector, (HIF3-34P-2.54DS)		
J 5	Connector, (DFI-12P-2.5DS)		
J 6	Connector, (DFI-2S-2.5R24)		
J 7	Connector, (DFI-2P-2.5DS)		
J 8	Connector, (DFI-3P-2.5DSA)		
J 9	Connector, (DFI-3S-2.5R24)		
J10	Connector, (DFI-2P-2.5DSA)		
J11	Connector, (DFI-2P-2.5DSA)		
K 1	Relay, (DX2-12V)		
K 2	Relay, (NR-HD-12V)		
L 1	Coil, (SP0408-R47K)	0.47 $\mu$ H	
L 2	Coil, (SP0408-R47K)	0.47 $\mu$ H	
L 3	Coil, (SP0408-R68K)	6.8 $\mu$ H	
L 4	Coil, (LF8-100K)	10 $\mu$ H	
L 5	Coil, (LF8-100K)	10 $\mu$ H	

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CKT REF	DESCRIPTION	RATING	NOTE
L 6	Coil, (LF8-100K)	10 $\mu$ H	
L 7	Coil, (LF8-100K)	10 $\mu$ H	
L 8	Coil, (LF8-100K)	10 $\mu$ H	
L 9	Coil, (LF8-100K)	10 $\mu$ H	
L10	Not assigned		
L11	Coil, (339T13571)		
L12	Coil, (339T13571)		
L13	Coil, (LF8-100K)	10 $\mu$ H	
L14	Not assigned		
L15	Coil, (SP0408-6R8K)	6.8 $\mu$ H	
L16	Coil, (SP0408-2R2K)	2.2 $\mu$ H	
L17	Coil, (SP0408-2R2K)	2.2 $\mu$ H	
L18	Coil, (LF8-100K)	10 $\mu$ H	
L19	Coil, (LF8-100K)	10 $\mu$ H	
L20	Coil, (LF8-100K)	10 $\mu$ H	
L21	Coil, (LF8-100K)	10 $\mu$ H	
L22	Coil, (LF8-100K)	10 $\mu$ H	
L23	Not assigned		
L24	Coil, (342T70487B)	10.4 $\mu$ H	
L25	Coil, (342T70487B)	10.4 $\mu$ H	
L26	Coil, (342T70487B)	10.4 $\mu$ H	
L27	Coil, (339T18846)	13 $\mu$ H	
L28	Coil, (339T18846)	13 $\mu$ H	
L29	Coil, (339T18846)	13 $\mu$ H	
L30	Not assigned		
L31	Coil, (LF8-100K)	10 $\mu$ H	
L32	Coil, (LF8-100K)	10 $\mu$ H	
L33	Coil, (LF8-100K)	10 $\mu$ H	
L34	Not assigned		
L35	Not assigned		
L36	Not assigned		
L37	Coil, (SP0408-6R8K)	6.8 $\mu$ H	
L38	Not assigned		
L39	Coil, (LF8-100K)	10 $\mu$ H	
L40	Coil, (LF8-100K)	10 $\mu$ H	
L41	Coil, (LF8-100K)	10 $\mu$ H	
L42	Coil, (LF8-100K)	10 $\mu$ H	
L43	Coil, (LF8-100K)	10 $\mu$ H	
L44	Coil, (339T13571)		
L45	Coil, (339T13571)		
L46	Coil, (339T13571)		
L47	Not assigned		
L48	Coil, (LH1-471K)	470 $\mu$ H	
L49	Coil, (LH1-471K)	470 $\mu$ H	
L50	Coil, (LH1-471K)	470 $\mu$ H	

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CKT REF	DESCRIPTION	RATING	NOTE
Q 1	Not assigned		
Q 2	Not assigned		
Q 3	Di, (1S134)		
Q 4	Di, (1S134)		
Q 5	Tr, (2SA1206)		
Q 6	Tr, (2SC2901)		
Q 7	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 8	Tr, (2SC2901)		
Q 9	Di, (1S134)		
Q10	Tr, (31D21)		
Q11	Tr, (2SC2901)		
Q12	Di, (1S134)		
Q13	Tr, (31D21)		
Q14	Tr, (2SC2901)		
Q15	Tr, (2SC2901)		
Q16	Tr, (2SC2901)		
Q17	Tr, (2SA1206)		
Q18	Di, (1S134)		
Q19	Di, (1S134)		
Q20	IC, (DTC114EF)		
Q21	Not assigned		
Q22	Tr, (2SC2901)		
Q23	Not assigned		
Q24	IC, (74LS11)		
Q25	Tr, (2SC2901)		
Q26	Tr, (2SC2901)		
Q27	Tr, (2SC2901)		
Q28	Tr, (2SC2901)		
Q29	Tr, (2SC2901)		
Q30	Not assigned		
Q31	Not assigned		
Q32	Tr, (2SC1010L)		
Q33	Tr, (2SC1010L)		
Q34	Tr, (2SC1010L)		
Q35	Di, (1S2222)		
Q36	Di, (1S2222)		
Q37	Di, (1S2222)		
Q38	Di, (1S2222)		
Q39	Di, (1S2222)		
Q40	Di, (1S2222)		
Q41	Di, (1S2222)		
Q42	Tr, (2SC1844)		
Q43	Tr, (2SC1844)		
Q44	IC, (DTC143EF)		
Q45	Not assigned		

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CKT REF	DESCRIPTION	RATING	NOTE
Q46	Not assigned		
Q47	IC, (DTA143EF)		
Q48	IC, (DTA143EF)		
Q49	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q50	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q51	Tr, (2SA1151)		
Q52	Tr, (2SA1206)		
Q53	Thermistor, (OS-D5-300-1)		
Q54	Thermistor, (42D21)		
Q55	Not assigned		
Q56	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q57	Tr, (2SC2901)		
Q58	Tr, (2SA1206)		
Q59	Di, (1SV34)		
Q60	Tr, (2SC2901)		
Q61	Tr, (2SA1206)		
Q62	Di, (1SV34)		
Q63	Di, (1SV34)		
Q64	Tr, (2SC2901)		
Q65	Di, (1SV34)		
Q66	Tr, (2SC2901)		
Q67	Di, (1SV34)		
Q68	Tr, (2SC2901)		
Q69	Tr, (2SC2901)		
Q70	Not assigned		
Q71	Not assigned		
Q72	Not assigned		
Q73	Di, breakdown, (1S252)	5.9 to 6.5V, 250mW	
Q74	IC, (PC258C)		
Q75	Di, (1SV34)		
Q76	IC, (PC258C)		
Q77	IC, (TC40H374P)		
Q78	IC, (NE5532)		
Q79	IC, (PC803C)		
Q80	IC, (PC803C)		
Q81	IC, (PC803C)		
Q82	IC, (PC258C)		
Q83	IC, (HI-201-5)		
Q84	IC, (PC258C)		
Q85	IC, (HI-201-5)		
Q86	IC, (PC258C)		
Q87	Posistor, (PTH60U331M)		
Q88	Posistor, (PTH60U331M)		

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING	NOTE
Q 89	IC, (TC40H374P)		
Q 90	IC, (TC40H374P)		
Q 91	IC, (TC40H374P)		
Q 92	IC, (TC40H38P)		
Q 93	IC, (DTC114EP)		
Q 94	Not assigned		
Q 95	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q 96	Di, breakdown, (RD9.1EB)	8.5 to 9.6V, 400mW	
Q 97	Not assigned		
Q 98	Not assigned		
Q 99	Not assigned		
Q100	Not assigned		
Q101	Tr, (2SC1844)		
Q102	Tr, (2SA1151)		
Q103	Tr, (2SC1844)		
Q104	Not assigned		
Q105	Thermistor (CS-D5-300-1)		
Q106	Thermistor (CS-D5-300-1)		Q'ty 0 or 1
R 1	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R 2	CF, (ARD25T272J)	2.7kΩ, ±5%, 1/4W	
R 3	CF, (ARD25T272J)	2.7kΩ, ±5%, 1/4W	
R 4	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R 5	CF, (ARD25T102J)	1.0kΩ, ±5%, 1/4W	
R 6	CF, (ARD25T * J)	100 to 390Ω, ±5%, 1/4W	*
R 7	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R 8	MF, (RN14K2H151J)	150Ω, ±5%, 1/4W	
R 9	Not assigned		
R10	Not assigned		
R11	CF, (ARD25T331J)	330Ω, ±5%, 1/4W	
R12	CF, (ARD25T470J)	47Ω, ±5%, 1/4W	
R13	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R14	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W	
R15	CF, (ARD25T821J)	820Ω, ±5%, 1/4W	
R16	CF, (ARD25T272J)	2.7kΩ, ±5%, 1/4W	
R17	CF, (ARD25T151J)	150Ω, ±5%, 1/4W	
R18	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R19	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R20	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W	
R21	CF, (ARD25T470J)	47Ω, ±5%, 1/4W	
R22	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W	
R23	CF, (ARD25T821J)	820Ω, ±5%, 1/4W	
R24	CF, (ARD25T222J)	2.2kΩ, ±5%, 1/4W	
R25	CF, (ARD25T151J)	150Ω, ±5%, 1/4W	
R26	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R27	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R28	CF, (ARD25T470J)	47Ω, ±5%, 1/4W	
R29	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W	
R30	CF, (ARD25T151J)	150Ω, ±5%, 1/4W	
R31	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W	
R32	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W	
R33	CF, (ARD25T470J)	47Ω, ±5%, 1/4W	
R34	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R35	CF, (ARD25T221J)	220Ω, ±5%, 1/4W	

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING	NOTE
R36	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W	
R37	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W	
R38	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R39	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R40	CF, (ARD25T271J)	270Ω, ±5%, 1/4W	
R41	CF, (ARD25T271J)	270Ω, ±5%, 1/4W	
R42	CF, (ARD25T391J)	390Ω, ±5%, 1/4W	
R43	CF, (ARD25T221J)	220Ω, ±5%, 1/4W	
R44	CF, (ARD25T390J)	39Ω, ±5%, 1/4W	
R45	CF, (ARD25T750J)	75Ω, ±5%, 1/4W	
R46	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W	
R47	Not assigned		
R48	Not assigned		
R49	CF, (ARD25T561J)	560Ω, ±5%, 1/4W	
R50	CF, (ARD25T221J)	220Ω, ±5%, 1/4W	
R51	CF, (ARD25T470J)	47Ω, ±5%, 1/4W	Q'ty 0 or 1
R52	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R53	CF, (ARD25T822J)	8.2kΩ, ±5%, 1/4W	
R54	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R55	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R56	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R57	Not assigned		
R58	Not assigned		
R59	Not assigned		
R60	Not assigned		
R61	Not assigned		
R62	Not assigned		
R63	Not assigned		
R64	Not assigned		
R65	Not assigned		
R66	CF, (ARD25T822J)	8.2kΩ, ±5%, 1/4W	
R67	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R68	CF, (ARD25T561J)	560Ω, ±5%, 1/4W	
R69	CF, (ARD25T122J)	1.2kΩ, ±5%, 1/4W	
R70	CF, (ARD25T221J)	220Ω, ±5%, 1/4W	
R71	CF, (ARD25T821J)	820Ω, ±5%, 1/4W	
R72	CF, (ARD25T100J)	10Ω, ±5%, 1/4W	
R73	CF, (ARD25T682J)	6.8kΩ, ±5%, 1/4W	
R74	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R75	CF, (ARD25T821J)	820Ω, ±5%, 1/4W	
R76	MF, (RS1FB 150 J)	150Ω, ±5%, 1W	
R77	Not assigned		
R78	Not assigned		
R79	Not assigned		
R80	CF, (ARD25T221J)	220Ω, ±5%, 1/4W	

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CKT REF	DESCRIPTION	RATING	NOTE
R81	CF, (ARD25T821J)	820Ω, ±5%, 1/4W	
R82	CF, (ARD25T100J)	10Ω, ±5%, 1/4W	
R83	CF, (ARD25T821J)	820Ω, ±5%, 1/4W	
R84	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R85	CF, (ARD25T682J)	6.8kΩ, ±5%, 1/4W	
R86	MF, (RS1FB 150 J)	150Ω, ±5%, 1W	
R87	Not assigned		
R88	Not assigned		
R89	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W	
R90	Not assigned		
R91	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R92	CF, (ARD25T * J)	27kΩ to 100kΩ, ±5%, 1/4W	Q'ty 0 or 1
R93	CF, (ARD25T222J)	2.2kΩ, ±5%, 1/4W	
R94	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W	
R95	CF, (ARD25T562J)	5.6kΩ, ±5%, 1/4W	
R96	CF, (ARD25T330J)	33Ω, ±5%, 1/4W	Q'ty 0 or 1
R97	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R98	CF, (ARD25T123J)	12kΩ, ±5%, 1/4W	
R99	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R100	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W	
R101	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R102	CF, (ARD25T273J)	27kΩ, ±5%, 1/4W	
R103	CF, (ARD25T471J)	470Ω, ±5%, 1/4W	
R104	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W	
R105	CF, (ARD25T822J)	8.2kΩ, ±5%, 1/4W	
R106	CF, (ARD25T330J)	33Ω, ±5%, 1/4W	Q'ty 0 or 1
R107	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R108	CF, (ARD25T822J)	8.2kΩ, ±5%, 1/4W	
R109	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R110	CF, (ARD25T222J)	2.2kΩ, ±5%, 1/4W	
R111	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R112	CF, (ARD25T123J)	12kΩ, ±5%, 1/4W	
R113	CF, (ARD25T471J)	470Ω, ±5%, 1/4W	
R114	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W	
R115	CF, (ARD25T822J)	8.2kΩ, ±5%, 1/4W	
R116	CF, (ARD25T330J)	33Ω, ±5%, 1/4W	Q'ty 0 or 1
R117	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R118	CF, (ARD25T272J)	2.7kΩ, ±5%, 1/4W	
R119	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R120	CF, (ARD25T222J)	2.2kΩ, ±5%, 1/4W	
R121	Not assigned		
R122	Var. MF, (RJ-6S 10k )	10kΩ, 1/2W	
R123	CF, (ARD25T222J)	2.2kΩ, ±5%, 1/4W	
R124	Not assigned		
R125	CF, (ARD25T683J)	68kΩ, ±5%, 1/4W	

( ): Manufacturer's part number

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\* : Selected at factory

Parts list : Z22 IF BPF/AMP 1				
CKT REF	DESCRIPTION	RATING		NOTE
R126	Not assigned			
R127	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W		
R128	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W		
R129	Not assigned			
R130	Not assigned			
R131	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W		
R132	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W		
R133	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W		
R134	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R135	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W		
R136	Var, MF, (RJ-6S 1k $\Omega$ )	1k $\Omega$ , 1/2W		
R137	to			
R140	Not assigned			
R141	MF, Var, (RJ-4W 1k $\Omega$ )	1k $\Omega$ , 1/2W		
R142	MF, Var, (RJ-4W 5k $\Omega$ )	5k $\Omega$ , 1/2W		
R143	MF, Var, (RJ-4W 5k $\Omega$ )	5k $\Omega$ , 1/2W		
R144	to			
R147	Not assigned			
R148	CF, (ARD25T220J)	22 $\Omega$ , $\pm 5\%$ , 1/4W		
R149	CF, (ARD25T220J)	22 $\Omega$ , $\pm 5\%$ , 1/4W		
R150	Not assigned			
R151	CF, (ARD25T221J)	220 $\Omega$ , $\pm 5\%$ , 1/4W		
R152	CF, (ARD25T181J)	180 $\Omega$ , $\pm 5\%$ , 1/4W		
R153	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R154	Not assigned			
R155	CF, (ARD25T512J)	5.1k $\Omega$ , $\pm 5\%$ , 1/4W		
R156	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W		
R157	Not assigned			
R158	Not assigned			
R159	Not assigned			
R160	Not assigned			
R161	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		Q'ty 0 or 1
R162	CF, (ARD25T392J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W		
R163	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W		
R164	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R165	CF, (ARD25T681J)	680 $\Omega$ , $\pm 5\%$ , 1/4W		
R166	CF, (ARD25T271J)	270 $\Omega$ , $\pm 5\%$ , 1/4W		
R167	CF, (ARD25T561J)	560 $\Omega$ , $\pm 5\%$ , 1/4W		
R168	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R169	CF, (ARD25T221J)	220 $\Omega$ , $\pm 5\%$ , 1/4W		
R170	CF, (ARD25T*J)	220 $\Omega$ to 330 $\Omega$ , $\pm 5\%$ , 1/4W		
R171	CF, (ARD25T*J)	220 $\Omega$ to 1M $\Omega$ , $\pm 5\%$ , 1/4W		
R172	CF, (ARD25T392J)	3.9k $\Omega$ , $\pm 5\%$ , 1/4W		Q'ty 0 or 1
R173	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W		
R174	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R175	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R176	CF, (ARD25T271J)	270 $\Omega$ , $\pm 5\%$ , 1/4W		
R177	CF, (ARD25T271J)	270 $\Omega$ , $\pm 5\%$ , 1/4W		
R178	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		

( ) : Manufacturer's part number

\* : Selected at factory

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Parts List : Z22 IF BPF/AMP 1				
CKT REF	DESCRIPTION	RATING		NOTE
R179	CF, (ARD25T181J)	180 $\Omega$ , $\pm 5\%$ , 1/4W		
R180	CF, (ARD25T390J)	39 $\Omega$ , $\pm 5\%$ , 1/4W		
R181	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R182	CF, (ARD25T392J)	3.9k $\Omega$ , $\pm 5\%$ , 1/4W		
R183	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W		
R184	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R185	CF, (ARD25T681J)	680 $\Omega$ , $\pm 5\%$ , 1/4W		
R186	CF, (ARD25T681J)	680 $\Omega$ , $\pm 5\%$ , 1/4W		
R187	CF, (ARD25T470J)	47 $\Omega$ , $\pm 5\%$ , 1/4W		
R188	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R189	CF, (ARD25T182J)	1.8k $\Omega$ , $\pm 5\%$ , 1/4W		
R190	CF, (ARD25T392J)	3.9k $\Omega$ , $\pm 5\%$ , 1/4W		
R191	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W		
R192	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R193	CF, (ARD25T681J)	680 $\Omega$ , $\pm 5\%$ , 1/4W		
R194	CF, (ARD25T681J)	680 $\Omega$ , $\pm 5\%$ , 1/4W		
R195	CF, (ARD25T470J)	47 $\Omega$ , $\pm 5\%$ , 1/4W		
R196	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R197	CF, (ARD25T182J)	1.8k $\Omega$ , $\pm 5\%$ , 1/4W		
R198	CF, (ARD25T392J)	3.9k $\Omega$ , $\pm 5\%$ , 1/4W		
R199	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W		
R200	Not assigned			
R201	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R202	CF, (ARD25T511J)	510 $\Omega$ , $\pm 5\%$ , 1/4W		
R203	Var, MF, (RJ-4W 500 $\Omega$ )	500 $\Omega$ , 1/2W		
R204	CF, (ARD25T470J)	47 $\Omega$ , $\pm 5\%$ , 1/4W		
R205	CF, (ARD25T681J)	680 $\Omega$ , $\pm 5\%$ , 1/4W		
R206	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R207	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W		
R208	CF, (ARD25T271J)	270 $\Omega$ , $\pm 5\%$ , 1/4W		
R209	CF, (ARD25T470J)	47 $\Omega$ , $\pm 5\%$ , 1/4W		
R210	CF, (ARD25T271J)	270 $\Omega$ , $\pm 5\%$ , 1/4W		
R211	Var, MF, (RJ-4W 5k $\Omega$ )	5k $\Omega$ , 1/2W		
R212	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R213	MF, (RN14K2E1211D)	1.21k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R214	MF, (RN14K2E2871D)	2.87k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R215	MF, (RN14K2E1001D)	1.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R216	MF, (RN14K2E9091D)	9.09k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R217	MF, (RN14K2E1515D)	2.15k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R218	MF, (RN14K2E1272D)	12.7k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R219	MF, (RN14K2E4222D)	42.2k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R220	MF, (RN14K2E2212D)	22.1k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R221	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R222	MF, (RN14K2E2491D)	2.49k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R223	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W		

( ) : Manufacturer's part number

\* : Selected at factory

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Parts List : Z22 IF BPF/AMP 1				
CKT REF	DESCRIPTION	RATING		NOTE
R224	Not assigned			
R225	Not assigned			
R226	Not assigned			
R227	Not assigned			
R228	Not assigned			
R229	Not assigned			
R230	MF, (RN14K2E2672D)	26.7k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R231	MF, (RN14K2E4751D)	4.75k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R232	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R233	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R234	CF, (ARD25T105J)	1M $\Omega$ , $\pm 5\%$ , 1/4W		
R235	CF, (ARD25T*J)	8.2 to 12k $\Omega$ , $\pm 5\%$ , 1/4W		*
R236	Var, MF, (RJ-4W 5k $\Omega$ )	5k $\Omega$ , 1/2W		
R237	Var, MF, (RJ-4W 1k $\Omega$ )	1k $\Omega$ , 1/2W		
R238	Var, MF, (RJ-4W 1k $\Omega$ )	1k $\Omega$ , 1/2W		
R239	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R240	MF, (RN14K2E2672D)	26.7k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R241	MF, (RN14K2E4751D)	4.75k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R242	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R243	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R244	CF, (ARD25T105J)	1M $\Omega$ , $\pm 5\%$ , 1/4W		
R245	CF, (ARD25T822J)	8.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R246	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R247	Var, MF, (RJ-4W 5k $\Omega$ )	5k $\Omega$ , 1/2W		
R248	Var, MF, (RJ-4W 1k $\Omega$ )	1k $\Omega$ , 1/2W		
R249	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R250	Not assigned			
R251	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R252	MF, (RN14K2E8871D)	8.87k $\Omega$ to 10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R253	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R254	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R255	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W		
R256	CF, (ARD25T*J)	22 to 33k $\Omega$ , $\pm 5\%$ , 1/4W		*
R257	CF, (ARD25T392J)	3.9k $\Omega$ , $\pm 5\%$ , 1/4W		
R258	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W		
R259	Not assigned			
R260	Var, MF, (RJ-4W 10k $\Omega$ )	10k $\Omega$ , 1/2W		
R261	Var, MF, (RJ-4W 2k $\Omega$ )	2k $\Omega$ , 1/2W		
R262	Var, MF, (RJ-4W 1k $\Omega$ )	1k $\Omega$ , 1/2W		
R263	Not assigned			
R264	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R265	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W		
R266	Single in-line array, (IHR-8-472JA)	4.7k $\Omega$ x 8, 1/8W		
R267	Single in-line array, (IHR-6-472JA)	4.7k $\Omega$ x 6, 1/8W		

( ) : Manufacturer's part number

\* : Selected at factory

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Parts List : Z22 IF BPF/AMP 1				
CKT REF	DESCRIPTION	RATING		NOTE
R268	Single in-line array, (IHR-8-104JA)	100k $\Omega$ x 8, 1/8W		
R269	Single in-line array, (IHR-8-104JA)	100k $\Omega$ x 8, 1/8W		
R270	MF, (RN14K2E1242D)	12.4k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R271	MF, (RN14K2E4021D)	4.02k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R272	MF, (RN14K2E1242D)	12.4k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R273	MF, (RN14K2E6191D)	6.19k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R274	MF, (RN14K2E4021D)	4.02k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R275	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R276	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R277	MF, (RN14K2E9391J)	9.39k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R278	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R279	MF, (RN14K2E1692D)	16.9k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R280	MF, (RN14K2E1212D)	12.1k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R281	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R282	MF, (RN14K2E1001D)	1.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R283	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R284	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R285	CF, (ARD25T153J)	15k $\Omega$ , $\pm 5\%$ , 1/4W		
R286	Var, MF, (RJ-4W 20k $\Omega$ )	20k $\Omega$ , 1/2W		
R287	Not assigned			
R288	CF, (ARD25T511J)	510 $\Omega$ , $\pm 5\%$ , 1/4W		
R289	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W		
R290	CF, (ARD25T151J)	150 $\Omega$ , $\pm 5\%$ , 1/4W		
R291	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R292	CF, (ARD25T470J)	47 $\Omega$ , $\pm 5\%$ , 1/4W		
R293	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W		
R294	Var, MF, (RJ-6S 2k $\Omega$ )	2k $\Omega$ , 1/2W		
R295	Not assigned			
R296	Not assigned			
R297	Not assigned			
R298	Not assigned			
R299	Not assigned			
R300	Not assigned			
R301	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W		
R302	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W		
R303	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W		
R304	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W		
R305	Var, MF, (RJ-4W200 $\Omega$ )			
R306	CF, (ARD25T*J)	220 $\Omega$ to 1M $\Omega$ , $\pm 5\%$ , 1/4W		*
R307	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W		
R308	CF, (ARD25T391J)	390 $\Omega$ , $\pm 5\%$ , 1/4W		
R309	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R310	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W		
R311	CF, (ARD25T*J)	22k $\Omega$ to 1M $\Omega$ , $\pm 5\%$ , 1/4W		*
Z 1	XTAL OSC, (TCO-706A)	19.9 MHz		
Z 2	M-9, (8 pins)			
Z 3	M-9, (8 pins)			

Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CK924F1H104Z)	0.1uF, +80/-20%, 50V	
C 2	Elect, (CE04W1E470)	47uF, ±20%, 25V	
C 3	Elect, (CE04W1E470)	47uF, ±20%, 25V	
C 4	Not assigned		
C 5	Not assigned		
C 6	Not assigned		
C 7	Not assigned		
C 8	Not assigned		
C 9	Not assigned		
C10	Cer, (CK45BH102KY)	1000pF, ±10%, 50V	
C11	Var, Cer, (TZ03Z070A)	2 to 7pF, 100V	
C12	Var, Cer, (TZ03T200E)	4.2 to 20pF, 100V	
C13	Cer, (CC45CH1H330JY)	33pF, ±5%, 50V	
C14	Tant, (CS-ELD2R2M)	2.2uF, ±20%, 20V	
C15	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C16	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C17	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C18	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C19	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C20	Not assigned		
C21	Not assigned		
C22	Not assigned		
C23	Not assigned		
C24	Not assigned		
C25	Tant, (CS-ELV010M)	1uF, ±20%, 35V	
C26	Cer, (CC45UJ1H220JY)	22pF, ±5%, 50V	
C27	Cer, (CK45BH102KY)	1000pF, ±10%, 50V	
C28	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V	
C29	Var, Cer, (TZ03Z070A)	2 to 7pF, 100V	
C30	Var, Cer, (TZ03T200E)	4.2 to 20pF, 100V	
C31	Cer, (CC45CH1H330JY)	33pF, ±5%, 50V	
C32	Tant, (CS-ELD2R2M)	2.2 F, ±20%, 20V	
C33	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C34	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C35	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C36	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C37	Cer, (CK924C1H103M)	0.01uF, ±20%, 50V	
C38	Cer, (CC45CH1H*JY)	10 to 22pF, ±5%, 50V	
C39	Cer, (CC45UJ1H220JY)	22pF, ±5%, 50V	
C40	Cer, (CK45BH102KY)	1000pF, ±10%, 50V	
C41	Cer, (CK924F1H104Z)	0.1uF, +80/-20%, 50V	
C42	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V	
C43	Var, Cer, (TZ03Z070A)	2 to 7pF, 100V	
C44	Var, Cer, (TZ03T200E)	4.2 to 20pF, 100V	
C45	Cer, (CC45CH1H330JY)	33pF, ±5%, 50V	

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING	NOTE
C46	Tant, (CS-ELD2R2M)	2.2 F, ±20%, 20V	
C47	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C48	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C49	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C50	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C51	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C52	Cer, (CC45CH1H100JY)	10pF, ±5%, 50V	
C53	Cer, (CC45UJ1H220JY)	22pF, ±5%, 50V	
C54	Cer, (CK45BH102KY)	1000pF, ±10%, 50V	
C55	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V	
C56	Var, Cer, (TZ03Z070A)	2 to 7pF, 100V	
C57	Var, Cer, (TZ03T200E)	4.2 to 20pF, 100V	
C58	Cer, (CC45CH1H330JY)	33pF, ±5%, 50V	
C59	Tant, (CS-ELD2R2M)	2.2 F, ±20%, 20V	
C60	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C61	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C62	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C63	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C64	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C65	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V	
C66	Cer, (CC45UJ1H220JY)	22pF, ±5%, 50V	
C67	Cer, (CK45BH102KY)	1000pF, ±10%, 50V	
C68	Cer, (CK924F1H104Z)	0.1uF, +80/-20%, 50V	
C69	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C70	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C71	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C72	Cer, (CC45CH1H101JY)	100pF, ±5%, 50V	
C73	Cer, (CK924C1H104M)	0.1 F, ±20%, 50V	
C74	Cer, (CK924C1H223M)	0.022 F, ±20%, 50V	
C75	Cer, (CK924C1H473M)	0.047 F, ±20%, 50V	
C76	Cer, (CK924C1H223M)	0.022 F, ±20%, 50V	
C77	Cer, (CK924C1H223M)	0.022 F, ±20%, 50V	
C78	Not assigned		
C79	Not assigned		
C80	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C81	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C82	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C83	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C84	Cer, (CK924C1H103M)	0.01 F, ±20%, 50V	
C85	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C86	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C87	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C88	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C89	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C90	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING	NOTE
C91	Not assigned		
C92	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V	
C93	Not assigned		
C94	Not assigned		
C95	Not assigned		
C96	Cer, (CK924C1H104M)	0.1uF, ±20%, 50V	
C97	Cer, (CC45CH1H080JY)	8pF, ±5%, 50V	
J 1	Connector, (DF1-12P2.5DS)		
J 2	Connector, (DF1-2P2.5DS)		
J 3	Connector, (DF1-2P2.5DS)		
L 1	Coil, (LF8-221K)	220uH	
L 2	Coil, (LF8-221K)	220uH	
L 3	Coil, (339T18847)		
L 4	Coil, (339T18847)		
L 5	Coil, (339T18847)		
L 6	Coil, (LF8-221K)	220uH	
L 7	Coil, (339T18847)		
L 8	Coil, (LF8-221K)	220uH	
Q 1	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q 2	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q 3	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q 4	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q 5	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q 6	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q 7	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q 8	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q 9	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW	
Q10	Not assigned		
Q11	Tr, (2SC943)		
Q12	Tr, (2SA603)		
Q13	Di, (1S2222)		
Q14	Di, (1S2222)		
Q15	Di, (1S597)		
Q16	Di, (1S597)		
Q17	Di, (1S597)		
Q18	Di, (1S953)		
Q19	Tr, (2SC1216)		
Q20	Tr, (2SC943)		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING	NOTE
Q21	Tr, (2SA603)		
Q22	Di, (1S2222)		
Q23	Di, (1S2222)		
Q24	Di, (1S597)		
Q25	Di, (1S597)		
Q26	Di, (1S597)		
Q27	Di, breakdown, (RD5.1E(3))	4.95 to 5.2V, 400mW	
Q28	Tr, (2SC1216)		
Q29	Tr, (2SC943)		
Q30	Tr, (2SA603)		
Q31	Di, (1S2222)		
Q32	Di, (1S2222)		
Q33	Di, (1S597)		
Q34	Di, (1S597)		
Q35	Di, (1S597)		
Q36	Not assigned		
Q37	Tr, (2SC1216)		
Q38	Tr, (2SC943)		
Q39	Tr, (2SA603)		
Q40	Di, (1S2222)		
Q41	Di, (1S2222)		
Q42	Di, (1S597)		
Q43	Di, (1S597)		
Q44	Di, (1S597)		
Q45	Tr, (2SC943)		
Q46	Tr, (2SC1216)		
Q47	Tr, (2SC1044)		
Q48	Tr, (2SC943)		
Q49	Tr, (2SA603)		
Q50	Di, (1S2222)		
Q51	Di, (1S2222)		
Q52	Di, (1S2222)		
Q53	Not assigned		
Q54	Di, (1S2222)		
Q55	Di, (1S2222)		
Q56	Di, (1S2222)		
Q57	Di, (1S2222)		
Q58	Tr, (2SC943)		
Q59	IC, (.PC16312H)		
Q60	Not assigned		
Q61	IC, (DTA143EF)		
Q62	IC, (DTA143EF)		
Q63	IC, (DTA143EF)		
Q64	IC, (DTA143EF)		
Q65	IC, (DTA143EF)		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING	NOTE
Q66	IC, (DTA143EF)		
Q67	IC, (DTA143EF)		
Q68	IC, (DTA143EF)		
Q69	IC, (DTA143EF)		
Q70	Not assigned		
Q71	Di, (18953)		
Q72	Di, (18953)		
Q73	Di, (18953)		
Q74	Di, breakdown, (RD2.0EB)	1.88 to 2.12V, 400mW	
R 1	Not assigned		
R17	Not assigned		
R18	CF, (ARD25T101J)	100k $\pm$ 5%, 1/4W	
R19	Not assigned		
R20	CF, (ARD25T393J)	39k $\pm$ 5%, 1/4W	
R21	CF, (ARD25T183J)	18k $\pm$ 5%, 1/4W	
R22	CF, (ARD25T682J)	6.8k $\pm$ 5%, 1/4W	
R23	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R24	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R25	CF, (ARD25T473J)	47k $\pm$ 5%, 1/4W	
R26	CF, (ARD25T682J)	6.8k $\pm$ 5%, 1/4W	
R27	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R28	Not assigned		
R29	Single in-line array, (IHR-8-104JA)	100k $\pm$ 5% x 8, 1/8W	
R30	Not assigned		
R31	CF, (ARD25T331J)	330k $\pm$ 5%, 1/4W	
R32	CF, (ARD25T331J)	330k $\pm$ 5%, 1/4W	
R33	CF, (ARD25T331J)	330k $\pm$ 5%, 1/4W	
R34	CF, (ARD25T331J)	330k $\pm$ 5%, 1/4W	
R35	Not assigned		
R36	Not assigned		
R37	Not assigned		
R38	Not assigned		
R39	CF, (ARD25T154J)	150k $\pm$ 5%, 1/4W	
R40	CF, (ARD25T152J)	1.5k $\pm$ 5%, 1/4W	
R41	CF, (ARD25T472J)	4.7k $\pm$ 5%, 1/4W	
R42	CF, (ARD25T223J)	22k $\pm$ 5%, 1/4W	
R43	Single in-line array, (IHR-4-562JB)	5.6k $\pm$ 5% x 4, 1/8W	
R44	Not assigned		
R45	Not assigned		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING	NOTE
R46	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R47	CF, (ARD25T221J)	220 $\pm$ 5%, 1/4W	
R48	CF, (ARD25T151J)	150 $\pm$ 5%, 1/4W	
R49	CF, (ARD25T334J)	330k $\pm$ 5%, 1/4W	
R50	CF, (ARD25T274J)	270k $\pm$ 5%, 1/4W	
R51	CF, (ARD25T221J)	220 $\pm$ 5%, 1/4W	
R52	CF, (ARD25T562J)	5.6k $\pm$ 5%, 1/4W	
R53	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R54	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R55	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R56	CF, (ARD25T473J)	47k $\pm$ 5%, 1/4W	
R57	CF, (ARD25T682J)	6.8k $\pm$ 5%, 1/4W	
R58	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R59	CF, (ARD25T334J)	330k $\pm$ 5%, 1/4W	
R60	CF, (ARD25T152J)	1.5k $\pm$ 5%, 1/4W	
R61	CF, (ARD25T472J)	4.7k $\pm$ 5%, 1/4W	
R62	CF, (ARD25T223J)	22k $\pm$ 5%, 1/4W	
R63	Single in-line array, (IHR-4-562JB)	5.6k $\pm$ 5% x 4, 1/8W	
R64	CF, (ARD25T154J)	150k $\pm$ 5%, 1/4W	
R65	CF, (ARD25T154J)	150k $\pm$ 5%, 1/4W	
R66	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R67	CF, (ARD25T151J)	150k $\pm$ 5%, 1/4W	
R68	CF, (ARD25T821J)	820 $\pm$ 5%, 1/4W	
R69	CF, (ARD25T334J)	330k $\pm$ 5%, 1/4W	
R70	CF, (ARD25T184J)	180k $\pm$ 5%, 1/4W	
R71	CF, (ARD25T221J)	220 $\pm$ 5%, 1/4W	
R72	CF, (ARD25T562J)	5.6k $\pm$ 5%, 1/4W	
R73	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R74	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R75	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R76	CF, (ARD25T473J)	47k $\pm$ 5%, 1/4W	
R77	CF, (ARD25T682J)	6.8k $\pm$ 5%, 1/4W	
R78	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R79	CF, (ARD25T334J)	330k $\pm$ 5%, 1/4W	
R80	CF, (ARD25T152J)	1.5k $\pm$ 5%, 1/4W	
R81	CF, (ARD25T512J)	5.1k $\pm$ 5%, 1/4W	
R82	CF, (ARD25T273J)	27k $\pm$ 5%, 1/4W	
R83	Single in-line array, (IHR-4-562JB)	5.6k $\pm$ 5% x 4, 1/8W	
R84	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R85	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R86	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R87	CF, (ARD25T821J)	820 $\pm$ 5%, 1/4W	

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING	NOTE
R88	CF, (ARD25T151J)	150 $\pm$ 5%, 1/4W	
R89	CF, (ARD25T334J)	330k $\pm$ 5%, 1/4W	
R90	CF, (ARD25T274J)	270k $\pm$ 5%, 1/4W	
R91	CF, (ARD25T221J)	220 $\pm$ 5%, 1/4W	
R92	CF, (ARD25T562J)	5.6k $\pm$ 5%, 1/4W	
R93	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R94	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R95	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R96	CF, (ARD25T473J)	47k $\pm$ 5%, 1/4W	
R97	CF, (ARD25T682J)	6.8k $\pm$ 5%, 1/4W	
R98	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R99	CF, (ARD25T334J)	330k $\pm$ 5%, 1/4W	
R100	CF, (ARD25T152J)	1.5k $\pm$ 5%, 1/4W	
R101	CF, (ARD25T512J)	5.1k $\pm$ 5%, 1/4W	
R102	CF, (ARD25T273J)	27k $\pm$ 5%, 1/4W	
R103	Single in-line array, (IHR-4-562JB)	5.6k $\pm$ 5% x 4, 1/8W	
R104	Not assigned		
R105	Not assigned		
R106	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R107	CF, (ARD25T821J)	820 $\pm$ 5%, 1/4W	
R108	CF, (ARD25T151J)	150 $\pm$ 5%, 1/4W	
R109	CF, (ARD25T334J)	330k $\pm$ 5%, 1/4W	
R110	CF, (ARD25T274J)	270k $\pm$ 5%, 1/4W	
R111	CF, (ARD25T221J)	220 $\pm$ 5%, 1/4W	
R112	CF, (ARD25T153J)	15k $\pm$ 5%, 1/4W	
R113	CF, (ARD25T153J)	15k $\pm$ 5%, 1/4W	
R114	CF, (ARD25T221J)	220 $\pm$ 5%, 1/4W	
R115	CF, (ARD25T392J)	3.9k $\pm$ 5%, 1/4W	
R116	CF, (ARD25T680J)	68 $\pm$ 5%, 1/4W	
R117	CF, (ARD25T100J)	10 $\pm$ 5%, 1/4W	
R118	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R119	MF, (RN14K2E2741D)	2.74k $\pm$ 0.5%, 1/4W	
R120	CF, (ARD25T822J)	8.2k $\pm$ 5%, 1/4W	
R121	CF, (ARD25T821J)	820 $\pm$ 5%, 1/4W	
R122	MF, (RN14K2E6190D)	619 $\pm$ 0.5%, 1/4W	
R123	MF, (RN14K2E1430D)	143 $\pm$ 0.5%, 1/4W	
R124	MF, (RN14K2E2741D)	2.74k $\pm$ 0.5%, 1/4W	
R125	CF, (ARD25T682J)	6.8k $\pm$ 5%, 1/4W	
R126	CF, (ARD25T222J)	2.2k $\pm$ 5%, 1/4W	
R127	Single in-line array, (IHR-4-104JA)	100k $\pm$ 5% x 4, 1/8W	
R128	Not assigned		
R129	Not assigned		
R130	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING	NOTE
R131	CF, (ARD25T821J)	820 $\pm$ 5%, 1/4W	
R132	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R133	Var, MF, (RJ-6S 2k )	2k , 1/2W	
R134	Var, MF, (RJ-6S 2k )	2k , 1/2W	
R135	Var, MF, (RJ-6S 2k )	2k , 1/2W	
R136	CF, (ARD25T151J)	150k $\pm$ 5%, 1/4W	
R137	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R138	Single in-line array, (IHR-5-332JB)	3.3k x 5, 1/8W	
R139	Var, MF, (RJ-6S 10k )	10k , 1/2W	
R140	Not assigned		
R141	Not assigned		
R142	CF, (ARD25T821J)	820 $\pm$ 5%, 1/4W	
R143	CF, (ARD25T471J)	470 $\pm$ 5%, 1/4W	
R144	CF, (ARD25T470J)	47 $\pm$ 5%, 1/4W	
X 1	XTAL OSC, (34X69276)		
X 2	XTAL OSC, (34X69276)		
X 3	XTAL OSC, (34X69276)		
X 4	XTAL OSC, (34X69276B)		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Elect, (CE04W1E101)	100pF, ±20%, 25V	
C 2	Elect, (CE04W1E101)	100pF, ±20%, 25V	
C 3	Elect, (CE04W1E101)	100pF, ±20%, 25V	
C 4	Cer, (CC924CH1H471J)	470pF, ±5%, 50V	
C 5	Not assigned		
C 6	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C 7	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C 8	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C 9	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C10	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C11	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C12	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C13	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C14	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C15	Elect, (CE04W1V100)	10μF, ±20%, 10V	
C16	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C17	Plast, (ECQ-V1H474JW)	0.47μF, ±5%, 50V	
C18	Plast, (ECQ-V1H105JW)	1μF, ±5%, 50V	
C19	Plast, (ECQ-V1H105JW)	1μF, ±5%, 50V	
C20	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C21	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C22	Elect, (CE04W1V100)	10μF, ±20%, 10V	
C23	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C24	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C25	Not assigned		
C26	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C27	Cer, (RPE111CH471G50)	470pF, ±2%, 50V	
C28	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C29	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C30	Cer, (CC924CH1H221J)	220pF, ±5%, 50V	
C31	Cer, (CC924CH1H221J)	220pF, ±5%, 50V	
C32	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C33	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C34	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C35	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C36	Cer, (CC45CH1H330JY)	33pF, ±5%, 50V	
C37	Not assigned		
C38	Not assigned		
C39	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C40	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C41	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C42	Elect, (CE04C1H2R2A)	2.2μF, ±20%, 16V	
C43	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C44	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C45	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING	NOTE
C46	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C47	Not assigned		
C48	Plast, (ECQ-V1H474JW)	0.47μF, ±5%, 50V	
C49	Cer, (CK732B1H102K)	1000pF, ±10%, 50V	
C50	Cer, (CK732B1H102K)	1000pF, ±10%, 50V	
C51	Not assigned		
C52	Plast, (ECQ-V1H105JW)	1μF, ±5%, 50V	
C53	Not assigned		
C54	Plast, (ECQ-V1H105JW)	1μF, ±5%, 50V	
C55	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V	
C56	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C57	Elect, (CE04W1A101)	100μF, ±20%, 10V	
C58	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V	
C59	Elect, (CE04W1E470)	47μF, ±20%, 25V	
J 1	Connector, (HIF3-34P-2.54DS)		
J 2	Connector, (27DP-LR-PC)		
J 3	Connector, (27DP-LR-PC)		
J 4	Connector, (DPI-8P-2.5DS)		
J 5	Connector, (PI021-2M)		
J 6	Connector, (PI021-2M)		
L 1	Coil, (LH1-471K)	470μH	
L 2	Coil, (LH1-471K)	470μH	
L 3	Coil, (LH1-471K)	470μH	
L 4	Coil, (LF8-221K)	220μH	
L 5	Coil, (LF8-221K)	220μH	
L 6	Coil, (LF8-101K)	100μH	
Q 1	IC, (TC40H138P)		
Q 2	IC, (TC40H374P)		
Q 3	IC, (TC40H374P)		
Q 4	IC, (74LS00)		
Q 5	Not assigned		
Q 6	IC, (74LS191)		
Q 7	IC, (74LS191)		
Q 8	IC, (74F191)		
Q 9	IC, (SP8695B)		
Q10	Di, (1S953)		
Q11	IC, (μPC1651G)		
Q12	IC, (74LS290)		
Q13	IC, (MC4044P)		
Q14	IC, (μPC258C)		
Q15	IC, (μPC649D)		

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING	NOTE
Q16	Tr, (DTC143EF)		
Q17	Tr, (DTC143EF)		
Q18	Not assigned		
Q19	IC, (μPC14312H)		
Q20	Tr, (2SC2721)		
Q21	Di, breakdown, (RD5.1E(3))	4.95 to 5.2V, 400mW	
Q22	Di, (1S953)		
Q23	IC, (μPC16312H)		
Q24	IC, (74S74)		
Q25	IC, (74LS393)		
Q26	IC, (74L21)		
Q27	Tr, (2SC2901)		
Q28	Tr, (2SC2901)		
Q29	IC, (NE5532A)		
Q30	Tr, (2SC1844)		
Q31	Not assigned		
Q32	IC, (NE5532A)		
Q33	Not assigned		
Q34	IC, (NJU021AD)		
Q35	Not assigned		
Q36	Not assigned		
Q37	Not assigned		
Q38	Not assigned		
Q39	Not assigned		
Q40	IC, (NE5532A)		
Q41	Not assigned		
Q42	Not assigned		
Q43	Di, (1S953)		
Q44	Tr, (2SC2570A)		
Q45	IC, (SP8630B)		
Q46	Not assigned		
Q47	Di, (1S953)		
Q48	Di, (1S953)		
Q49	Di, (1S953)		
Q50	Di, (1S953)		
R 1	Single in-line array, (IHR-8-103JB)	10kΩ x 8, 1/8W	
R 2	Single in-line array, (IHR-6-103JB)	10kΩ x 6, 1/8W	
R 3	CF, (ARD25T473J)	47kΩ, ±5%, 1/4W	
R 4	Not assigned		
R 5	MF, (RN14K2E3651D)	3.65kΩ, ±0.5%, 1/4W	
R 6	CF, (ARD25T561J)	560Ω, ±5%, 1/4W	
R 7	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W	
R 8	CF, (ARD25T750J)	750Ω, ±5%, 1/4W	
R 9	CF, (ARD25T751J)	750Ω, ±5%, 1/4W	
R10	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING	NOTE
R11	CF, (ARD25T680J)	68Ω, ±5%, 1/4W	
R12	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R13	CF, (ARD25T682J)	6.8kΩ, ±5%, 1/4W	
R14	Not assigned		
R15	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R16	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W	
R17	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W	
R18	CF, (ARD25T473J)	47kΩ, ±5%, 1/4W	
R19	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R20	MF, (RM73B2B153JD)	15kΩ, ±5%, 1/8W	
R21	MF, (NRTF1/4C 1.5kΩJ)	1.5kΩ, ±5%, 1/4W	
R22	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R23	MF, (RN14K2E2151D)	2.15kΩ, ±0.5%, 1/4W	
R24	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R25	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R26	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R27	CF, (ARD25T223J)	22kΩ, ±5%, 1/4W	
R28	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R29	CF, (ARD25T223J)	22kΩ, ±5%, 1/4W	
R30	MF, (RS1FB 33ΩJ)	33Ω, ±5%, 1W	
R31	CF, (ARD25T100J)	10Ω, ±5%, 1/4W	
R32	MF, (RN14K2E3401D)	3.40kΩ, ±0.5%, 1/4W	
R33	MF, (RN14K2E3401D)	3.40kΩ, ±0.5%, 1/4W	
R34	MF, (RN14K2E3921D)	3.92kΩ, ±0.5%, 1/4W	
R35	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W	
R36	Var, MF, (RJ-6S 500 )	500Ω, 1/2W	
R37	MF, (RN14K2E261D)	2.26kΩ, ±0.5%, 1/4W	
R38	MF, (RN14K2E1001D)	1kΩ, ±0.5%, 1/4W	
R39	MF, (RN14K2E1001D)	1kΩ, ±0.5%, 1/4W	
R40	Var, MF, (RJ-6S 5k )	5kΩ, 1/2W	
R41	MF, (RN14K2E2492D)	24.9kΩ, ±0.5%, 1/4W	
R42	Var, MF, (RJ-6S 5k )	5kΩ, 1/2W	
R43	MF, (RN14K2E3931D)	3.93kΩ, ±0.5%, 1/4W	
R44	MF, (RN14K2E1001D)	1kΩ, ±0.5%, 1/4W	
R45	MF, (RN14K2E1001D)	1kΩ, ±0.5%, 1/4W	
R46	MF, (RN14K2E7501D)	7.50kΩ, ±0.5%, 1/4W	
R47	MF, (RN14K2E4022D)	40.2kΩ, ±0.5%, 1/4W	
R48	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R49	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W	
R50	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W	
R51	MF, (RN14K2E3011D)	3.01kΩ, ±0.5%, 1/4W	
R52	Not assigned		
R53	Not assigned		
R54	MF, (RN14K2E1502D)	15.0kΩ, ±0.5%, 1/4W	
R55	CF, (ARD25T272J)	2.7kΩ, ±5%, 1/4W	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING	NOTE
R56	CF, (ARD25T272J)	2.7k $\Omega$ , $\pm 5\%$ , 1/4W	
R57	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R58	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W	
R59	Not assigned		
R60	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W	
R61	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R62	Not assigned		
R63	MF, (RN14K2E6042D)	60.4k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R64	Not assigned		
R65	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R66	CF, (ARD25T152J)	1.5k $\Omega$ , $\pm 5\%$ , 1/4W	
R67	MF, (RN14K2E3322D)	33.2k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R68	Not assigned		
R69	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R70	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W	
R71	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R72	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W	
R73	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R74	Not assigned		
R75	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R76	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R77	Not assigned		
R78	Not assigned		
R79	Not assigned		
R80	CF, (ARD25T221J)	220 $\Omega$ , $\pm 5\%$ , 1/4W	
R81	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W	
R82	CF, (ARD25T331J)	330 $\Omega$ , $\pm 5\%$ , 1/4W	
R83	Var, MF, (RJ-68 5k $\Omega$ )	5k $\Omega$ , 1/2W	
R84	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
Z 1	XTAL OSC, (TCO-707F)		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C 2	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C 3	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C 4	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C 5	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C 6	Not assigned		
C 7	Var, Cer, (TZ03T110A)	3 to 11pF, 100V	
C 8	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C 9	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C10	Elect, (CE04W1E101)	100 $\mu$ F, $\pm 20\%$ , 25V	
C11	Not assigned		
C12	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C13	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C14	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C15	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C16	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C17	Var, Cer, (TZ03T110A)	3 to 11pF, 100V	
C18	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C19	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C20	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C21	Not assigned		
C22	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C23	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C24	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C25	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C26	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C27	Var, Cer, (TZ03T110A)	3 to 11pF, 100V	
C28	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C29	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C30	Cer, (DSS310-55D223S)	0.022 $\mu$ F, $\pm 50\%$ , -20%, 50V	
C31	Cer, (DSS310-55D223S)	0.022 $\mu$ F, $\pm 50\%$ , -20%, 50V	
C32	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C33	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C34	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C35	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C36	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C37	Var, Cer, (TZ03T110A)	3 to 11pF, 100V	
C38	Not assigned		
C39	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C40	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C41	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C42	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C43	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C44	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C45	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
C46	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C47	Var, Cer, (TZ03T110A)	3 to 11pF, 100V	
C48	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C49	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C50	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C51	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C52	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C53	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C54	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C55	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C56	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C57	Var, Cer, (TZ03T110A)	3 to 11pF, 100V	
C58	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C59	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C60	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C61	Not assigned		
C62	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C63	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C64	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C65	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C66	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C67	Var, Cer, (TZ03T110A)	3 to 11pF, 100V	
C68	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C69	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C70	Not assigned		
C71	Cer, (CK45B1H102KY)	1000pF, $\pm 10\%$ , 50V	
C72	Not assigned		
C73	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V	
C74	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V	
C75	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V	
C76	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C77	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C78	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C79	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm 20\%$ , 50V	
C80	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C81	Cer, (CK924C1H473M)	0.047 $\mu$ F, $\pm 20\%$ , 50V	
C82	Cer, (CK924C1H473M)	0.047 $\mu$ F, $\pm 20\%$ , 50V	
C83	Cer, (CK924C1H473M)	0.047 $\mu$ F, $\pm 20\%$ , 50V	
C84	Cer, (CK45B1H471KY)	470pF, $\pm 10\%$ , 50V	
C85	Not assigned		
C86	Cer, (CC924CH1H620J)	62pF, $\pm 5\%$ , 50V	
C87	Cer, (CC924CH1H620J)	62pF, $\pm 5\%$ , 50V	
C88	Cer, (CC45CH1H01JY)	100pF, $\pm 5\%$ , 50V	
C89	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C90	Elect, (CE04W1A470)	47 $\mu$ F, $\pm 20\%$ , 10V	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
C91	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C92	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C93	Not assigned		
C94	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C95	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C96	Cer, (CC45CH1H050CY)	5pF, $\pm 0.5\%$ , 50V	
C97	Not assigned		
C98	Not assigned		
C99	Not assigned		
C100	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V	
C101	Not assigned		
C102	M Plast, (CF922N2A105K)	1 $\mu$ F, $\pm 10\%$ , 100V	
C103	M Plast, (CF922N2A224K)	0.22 $\mu$ F, $\pm 10\%$ , 100V	
C104	M Plast, (CF922N2A104K)	0.1 $\mu$ F, $\pm 10\%$ , 100V	
C105	M Plast, (CF922N2A104K)	0.1 $\mu$ F, $\pm 10\%$ , 100V	
C106	Not assigned		
C107	Plast, (ECQ-M1H103KZ)	0.01 $\mu$ F, $\pm 10\%$ , 50V	
C108	Plast, (ECQ-M1H223KZ)	0.022 $\mu$ F, $\pm 10\%$ , 50V	
C109	Plast, (ECQ-M1H103KZ)	0.01 $\mu$ F, $\pm 10\%$ , 50V	
C110	Plast, (ECQ-M1H102KZ)	1000pF, $\pm 10\%$ , 50V	
C111	Plast, (ECQ-M1H222KZ)	0.022 $\mu$ F, $\pm 10\%$ , 50V	
C112	Cer, (RPE111CH681G50)	680pF, $\pm 5\%$ , 50V	
C113	Cer, (CC924CH1H221J)	220pF, $\pm 5\%$ , 50V	
C114	Not assigned		
C115	Not assigned		
C116	Cer, (CC45CH1H100DY)	10pF, $\pm 0.5\%$ , 50V	
C117	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm 20\%$ , 50V	
C118	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm 20\%$ , 50V	
C119	Elect, (CE04W1A470)	47 $\mu$ F, $\pm 20\%$ , 10V	
C120	Elect, (CE04W1A470)	47 $\mu$ F, $\pm 20\%$ , 10V	
C121	Plast, (ECQ-M1H102KZ)	1000pF, $\pm 10\%$ , 50V	
C122	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C123	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C124	Cer, (CC45CH1H050CY)	5pF, $\pm 0.5\%$ , 50V	
C125	Cer, (CC45CH1H050CY)	5pF, $\pm 0.5\%$ , 50V	
C126	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C127	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C128	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C129	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C130	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C131	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C132	Elect, (CE04W1E101)	100 $\mu$ F, $\pm 20\%$ , 25V	
C133	Elect, (CE04W1E101)	100 $\mu$ F, $\pm 20\%$ , 25V	
C134	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 25V	
C135	Cer, (CC45CH1H050CY)	5pF, $\pm 0.25\%$ , 50V	
C136	Cer, (CC45CH1H050CY)	5pF, $\pm 0.25\%$ , 50V	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
J 1	Connector, (27DP-LR-PC)		
J 2	Connector, (DF1-2P2.5DSA)		
J 3	Connector, (DF1-2P2.5DSA)		
J 4	Connector, (DF1-2P2.5DSA)		
J 5	Connector, (HIF3-34P-2.54DS)		
K 1	Relay, (PRAD-4)		
K 2	Relay, (NF2E-12V)		
L 1	Not assigned		
L 2	Not assigned		
L 3	Coil, (LF8-220K)	22 $\mu$ H	
L 4	Coil, (SP0408-4R7K)	4.7 $\mu$ H	
L 5	Coil, (LF8-220K)	22 $\mu$ H	
L 6	Coil, (SP0408-4R7K)	4.7 $\mu$ H	
L 7	Not assigned		
L 8	Coil, (LF8-100K)	10 $\mu$ H	
L 9	Coil, (LF8-100K)	10 $\mu$ H	
L10	Coil, (LF8-220K)	22 $\mu$ H	
L11	Coil, (SP0408-4R7K)	4.7 $\mu$ H	
L12	Coil, (LF8-220K)	22 $\mu$ H	
L13	Coil, (SP0408-4R7K)	4.7 $\mu$ H	
L14	Coil, (LF8-220K)	22 $\mu$ H	
L15	Coil, (SP0408-4R7K)	4.7 $\mu$ H	
L16	Coil, (LF8-100K)	10 $\mu$ H	
L17	Coil, (LF8-100K)	10 $\mu$ H	
L18	Coil, (LF8-220K)	22 $\mu$ H	
L19	Coil, (SP0408-4R7K)	4.7 $\mu$ H	
L20	Coil, (LF8-220K)	22 $\mu$ H	
L21	Coil, (SP0408-4R7K)	4.7 $\mu$ H	
L22	Not assigned		
L23	Coil, (LF8-100K)	10 $\mu$ H	
L24	Not assigned		
L25	Coil, (LF8-221K)	220 $\mu$ H	
L26	Coil, (SP0408-4R7K)	4.7 $\mu$ H	
L27	Coil, (LF8-220K)	22 $\mu$ H	
L28	Coil, (LF8-220K)	22 $\mu$ H	
L29	Coil, (LF8-220K)	22 $\mu$ H	
L30	Coil, (LF8-220K)	22 $\mu$ H	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
L31	Coil, (LF8-220K)	22 $\mu$ H	
Q 1	Tr, (2SC2901)		
Q 2	Tr, (2SC2901)		
Q 3	Tr, (2SC2901)		
Q 4	Tr, (2SC2901)		
Q 5	Tr, (2SC2718)		
Q 6	Tr, (2SC2718)		
Q 7	Di, (1S953)		
Q 8	Di, (1S953)		
Q 9	Di, (1S953)		
Q10	Di, (1S953)		
Q11	Not assigned		
Q12	Tr, (2SC2901)		
Q13	Tr, (2SC2901)		
Q14	Tr, (2SC2901)		
Q15	Tr, (2SC2901)		
Q16	Tr, (2SC2901)		
Q17	Tr, (2SC2718)		
Q18	Di, (1S953)		
Q19	Di, (1S953)		
Q20	Di, (1S953)		
Q21	Di, (1S953)		
Q22	Di, (1S2222)		
Q23	Di, (1S2222)		
Q24	Not assigned		
Q25	Tr, (2SC2901)		
Q26	Tr, (2SC2901)		
Q27	Tr, (2SC2901)		
Q28	Tr, (2SC2901)		
Q29	Tr, (2SC2901)		
Q30	Tr, (2SC2718)		
Q31	Di, (1S953)		
Q32	Di, (1S953)		
Q33	Di, (1S953)		
Q34	Di, (1S953)		
Q35	Di, (1S2222)		
Q36	Di, (1S2222)		
Q37	Not assigned		
Q38	Tr, (2SC2901)		
Q39	Tr, (2SC2901)		
Q40	Tr, (2SC2901)		
Q41	Tr, (2SC2901)		
Q42	Tr, (2SC2901)		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
Q43	Tr, (2SC2718)		
Q44	Di, (1S953)		
Q45	Di, (1S953)		
Q46	Di, (1S953)		
Q47	Di, (1S953)		
Q48	Di, (1S2222)		
Q49	Di, (1S2222)		
Q50	Not assigned		
Q51	Tr, (2SC2901)		
Q52	Tr, (2SC2901)		
Q53	Tr, (2SC2901)		
Q54	Tr, (2SC2901)		
Q55	Tr, (2SC2901)		
Q56	Di, (1S953)		
Q57	Di, (1S953)		
Q58	Di, (1S2222)		
Q59	Di, (1S2222)		
Q60	Di, (1S2222)		
Q61	Tr, (2SC2901)		
Q62	Tr, (2SC2901)		
Q63	Tr, (2SC2901)		
Q64	Tr, (2SC2901)		
Q65	Tr, (2SC2901)		
Q66	Tr, (2SC2718)		
Q67	Di, (1S897)		
Q68	Di, (1S897)		
Q69	Di, (1S2222)		
Q70	Di, (1S2222)		
Q71	Di, (1S2222)		
Q72	Di, (1S2222)		
Q73	Not assigned		
Q74	Tr, (2SC2901)		
Q75	Tr, (2SC2901)		
Q76	Tr, (2SC2901)		
Q77	Tr, (2SC2901)		
Q78	Tr, (2SC2901)		
Q79	Tr, (2SC2901)		
Q80	Di, (1S897)		
Q81	Di, (1S897)		
Q82	Di, (1S953)		
Q83	Di, (1S953)		
Q84	Di, (1S2222)		
Q85	Di, (1S2222)		
Q86	Di, (1S2222)		
Q87	Not assigned		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
Q88	IC, (TC5067BP)		
Q89	Not assigned		
Q90	Tr, (2SC2901)		
Q91	Tr, (2SC2901)		
Q92	Di, (1S897)		
Q93	Di, (1S897)		
Q94	Di, (1S897)		
Q95	Tr, (2SC2369)		
Q96	Tr, (2SA1057)		
Q97	IC, (PA49A)		
Q98	IC, (PC258C)		
Q99	Di, breakdown, (1S252)	5.9 to 6.5V, 250mW	
Q100	IC, (TC4051BP)		
Q101	IC, (HA3-2525-5)		
Q102	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q103	Tr, (2SC2718)		
Q104	Tr, (2SC2718)		
Q105	Tr, (2SC2718)		
Q106	Tr, (2SC2718)		
Q107	Tr, (2SC2718)		
Q108	Tr, (2SC2718)		
Q109	Tr, (2SC2718)		
Q110	Tr, (2SC2718)		
Q111	IC, (TC4028BP)		
Q112	Di, breakdown, (RD5.1E(3))	4.95 to 5.2V, 400mW	Q'ty 0 or 1
Q113	IC, (HA3-2525-3)		
Q114	Di, breakdown, (RD9.1EB)	8.5 to 9.6V, 400mW	
Q115	IC, (TC4052BP)		
Q116	Not assigned		
Q117	IC, (PC16312H)		
Q118	IC, (TC40H374P)		
Q119	IC, (TC40H174P)		
Q120	IC, (TC40H138P)		
Q121	Thermistor, (OS-D5-300-1)		Q'ty 0 or 1
Q122	Thermistor, (OS-D5-300-1)		
Q123	Thermistor, (OS-D5-300-1)		Q'ty 0 or 1
Q124	Thermistor, (OS-D5-300-1)		Q'ty 0 or 1
Q125	Thermistor, (OS-D5-300-1)		Q'ty 0 or 1
Q126	Thermistor, (OS-D5-300-1)		Q'ty 0 or 1

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR				
CKT REF	DESCRIPTION	RATING		NOTE
Q127	Thermistor, (OS-D5-300-1)			Q'ty 0 or 1
Q128	Thermistor, (OS-D5-300-1)			Q'ty 0 or 1
Q129	Thermistor, (OS-D5-300-1)			Q'ty 0 or 1
Q130	Thermistor, (OS-D5-300-1)			Q'ty 0 or 1
Q131	Di, (1S953)			Q'ty 0 or 1
Q132	Di, (1S953)			Q'ty 0 or 1
Q133	IC, (HA3-2525-5)			
Q134	IC, (uPC649C)			
Q135	IC, (TC4053BP)			
Q136	IC, (HA3-2525-5)			
Q137	IC, (HA3-2525-5)			
Q138	IC, (uPC14308H)			
Q139	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q140	Di, (RDS.1EB)	4.95 to 5.2V, 400mW		
R 1	CF, (ARD25T201J)	200Ω, ±5%, 1/4W		
R 2	MF, (RN14K2E8660D)	866Ω, ±0.5%, 1/4W		
R 3	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W		
R 4	MF, (RN14K2E2431D)	2.43kΩ, ±0.5%, 1/4W		
R 5	MF, (RN14K2E3570D)	357Ω, ±0.5%, 1/4W		
R 6	MF, (RN14K2E2001D)	2kΩ, ±0.5%, 1/4W		
R 7	MF, (RN14K2E6980D)	69.8Ω, ±0.5%, 1/4W		
R 8	MF, (RN14K2E9090D)	90.9Ω, ±0.5%, 1/4W		
R 9	MF, (RN14K2E * D)	1k to 1.15kΩ, ±0.5%, 1/4W		Q'ty 0 or 1, *
R 10	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R 11	CF, (ARD25T * J)	10Ω to 100kΩ, ±5%, 1/4W		Q'ty 0 or 1, *
R 12	Var, MF, (RJ-6P 200Ω)	200Ω, 1/2W		
R 13	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R 14	MF, (RN14K2E1431D)	1.43kΩ, ±0.5%, 1/4W		
R 15	MF, (RN14K2E * D)	1.78k to 1.87kΩ, ±0.5%, 1/4W		Q'ty 0 or 1, *
R 16	CF, (ARD25T * J)	10Ω to 100kΩ, ±5%, 1/4W		Q'ty 0 or 1, *
R 17	Not assigned			
R 18	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W		
R 19	CF, (ARD25T122J)	1.2kΩ, ±5%, 1/4W		
R 20	Not assigned			

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR				
CKT REF	DESCRIPTION	RATING		NOTE
R21	Not assigned			
R22	MF, (RN14K2E8660D)	866Ω, ±0.5%, 1/4W		
R23	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W		
R24	MF, (RN14K2E2211D)	2.21kΩ, ±0.5%, 1/4W		
R25	MF, (RN14K2E3570D)	357Ω, ±0.5%, 1/4W		
R26	CF, (ARD25T202J)	2kΩ, ±5%, 1/4W		
R27	MF, (RN14K2E32R4D)	32.4Ω, ±0.5%, 1/4W		
R28	MF, (RN14K2E43R2D)	43.2Ω, ±0.5%, 1/4W		
R29	MF, (RN14K2E9090D)	909Ω, ±0.5%, 1/4W		
R30	MF, (RN14K2E1001D)	1kΩ, ±0.5%, 1/4W		
R31	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R32	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R33	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R34	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R35	CF, (ARD25T * J)	10 to 100kΩ, ±5%, 1/4W		Q'ty 0 or 1, *
R36	Not assigned			
R37	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W		
R38	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W		
R39	CF, (ARD25T122J)	1.2kΩ, ±5%, 1/4W		
R40	Not assigned			
R41	Not assigned			
R42	MF, (RN14K2E8660D)	866Ω, ±0.5%, 1/4W		
R43	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W		
R44	MF, (RN14K2E2211D)	2.21kΩ, ±0.5%, 1/4W		
R45	MF, (RN14K2E3570D)	357Ω, ±0.5%, 1/4W		
R46	CF, (ARD25T202J)	2kΩ, ±5%, 1/4W		
R47	MF, (RN14K2E32R4D)	32.4Ω, ±0.5%, 1/4W		
R48	MF, (RN14K2E51R1D)	51.1Ω, ±0.5%, 1/4W		
R49	MF, (RN14K2E * D)	1.10k to 1.27kΩ, ±0.5%, 1/4W		*
R50	MF, (RN14K2E1001D)	1kΩ, ±0.5%, 1/4W		
R51	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R52	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R53	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R54	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R55	CF, (ARD25T * J)	10 to 100kΩ, ±5%, 1/4W		Q'ty 0 or 1, *
R56	Not assigned			
R57	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R58	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W		
R59	CF, (ARD25T122J)	1.2kΩ, ±5%, 1/4W		
R60	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R61	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R62	MF, (RN14K2E8660D)	866Ω, ±0.5%, 1/4W		
R63	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W		
R64	MF, (RN14K2E2211D)	2.21kΩ, ±0.5%, 1/4W		

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\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR				
CKT REF	DESCRIPTION	RATING		NOTE
R65	MF, (RN14K2E3570D)	357Ω, ±0.5%, 1/4W		
R66	MF, (RN14K2E4871D)	4.87kΩ, ±0.5%, 1/4W		
R67	MF, (RN14K2E17R8D)	17.8Ω, ±0.5%, 1/4W		
R68	MF, (RN14K2E33R2D)	33.2Ω, ±0.5%, 1/4W		
R69	MF, (RN14K2E151D)	1.15kΩ, ±0.5%, 1/4W		
R70	MF, (RN14K2E1271D)	1.27kΩ, ±0.5%, 1/4W		
R71	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R72	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R73	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R74	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R75	CF, (ARD25T * J)	10 to 100kΩ, ±5%, 1/4W		Q'ty 0 or 1, *
R76	Not assigned			
R77	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W		
R78	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W		
R79	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W		
R80	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R81	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R82	MF, (RN14K2E8660D)	866Ω, ±0.5%, 1/4W		
R83	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W		
R84	MF, (RN14K2E2211D)	2.21kΩ, ±0.5%, 1/4W		
R85	MF, (RN14K2E3570D)	357Ω, ±0.5%, 1/4W		
R86	MF, (RN14K2E4871D)	4.87kΩ, ±0.5%, 1/4W		
R87	MF, (RN14K2E33R2D)	33.2Ω, ±0.5%, 1/4W		
R88	MF, (RN14K2E57R6D)	57.6Ω, ±0.5%, 1/4W		
R89	MF, (RN14K2E1301D)	1.3kΩ, ±0.5%, 1/4W		
R90	MF, (RN14K2E * D)	1.15k to 1.33kΩ, ±0.5%, 1/4W		*
R91	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R92	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R93	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R94	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R95	CF, (ARD25T * J)	10 to 100kΩ, ±5%, 1/4W		Q'ty 0 or 1, *
R96	Not assigned			
R97	MF, (RN14K2E51R1D)	51.1Ω, ±0.5%, 1/4W		
R98	MF, (RN14K2E73R2D)	73.2Ω, ±0.5%, 1/4W		
R99	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R100	MF, (RN14K2E8660D)	866Ω, ±0.5%, 1/4W		
R101	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W		
R102	MF, (RN14K2E2211D)	2.21kΩ, ±0.5%, 1/4W		
R103	MF, (RN14K2E3570D)	357Ω, ±0.5%, 1/4W		
R104	MF, (RN14K2E4871D)	4.87kΩ, ±0.5%, 1/4W		
R105	CF, (ARD25T560J)	56Ω, ±5%, 1/4W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR				
CKT REF	DESCRIPTION	RATING		NOTE
R106	CF, (ARD25T390J)	39Ω, ±5%, 1/4W		
R107	Var, MF, (RJ-6P 100Ω)	100Ω, 1/2W		
R108	MF, (RN14K2E14R7D)	14.7Ω, ±0.5%, 1/4W		
R109	MF, (RN14K2E33R2D)	33.2Ω, ±0.5%, 1/4W		
R110	MF, (RN14K2E * D)	1.1k to 1.33kΩ, ±0.5%, 1/4W		*
R111	CF, (ARD25T391J)	39Ω, ±5%, 1/4W		
R112	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R113	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R114	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R115	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R116	CF, (ARD25T * J)	10 to 100kΩ, ±5%, 1/4W		Q'ty 0 or 1, *
R117	Not assigned			
R118	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R119	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W		
R120	CF, (ARD25T122J)	1.2kΩ, ±5%, 1/4W		
R121	CF, (ARD25T223J)	22kΩ, ±5%, 1/4W		
R122	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R123	CF, (ARD25T270J)	27Ω, ±5%, 1/4W		
R124	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R125	MF, (RN14K2E8660D)	866Ω, ±0.5%, 1/4W		
R126	MF, (RN14K2E4990D)	499Ω, ±0.5%, 1/4W		
R127	MF, (RN14K2E2211D)	2.21kΩ, ±0.5%, 1/4W		
R128	MF, (RN14K2E3570D)	357Ω, ±0.5%, 1/4W		
R129	MF, (RN14K2E4871D)	4.87kΩ, ±0.5%, 1/4W		
R130	MF, (RN14K2E32R4D)	32.4Ω, ±0.5%, 1/4W		
R131	MF, (RN14K2E51R1D)	51.1Ω, ±0.5%, 1/4W		
R132	MF, (RN14K2E25R5D)	25.5Ω, ±0.5%, 1/4W		
R133	MF, (RN14K2E43R2D)	43.2Ω, ±0.5%, 1/4W		
R134	MF, (RN14K2E1331D)	1.33kΩ, ±0.5%, 1/4W		
R135	MF, (RN14K2E1580D)	158Ω, ±0.5%, 1/4W		
R136	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R137	CF, (ARD25T121J)	120Ω, ±5%, 1/4W		
R138	CF, (ARD25T71J)	270Ω, ±5%, 1/4W		
R139	CF, (ARD25T474J)	470kΩ, ±5%, 1/4W		
R140	CF, (ARD25T223J)	22kΩ, ±5%, 1/4W		
R141	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R142	CF, (ARD25T680J)	68Ω, ±5%, 1/4W		
R143	CF, (ARD25T * J)	10 to 100kΩ, ±5%, 1/4W		Q'ty 0 or 1, *
R144	Not assigned			
R145	Not assigned			
R146	Not assigned			
R147	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
R148	CF, (ARD25T471J)	470 $\Omega$ , $\pm 5\%$ , 1/4W	
R149	CF, (ARD25T510J)	510 $\Omega$ , $\pm 5\%$ , 1/4W	
R150	MF, (RN14K2E5110D)	511 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R151	MF, (RN14K2E9760D)	976 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R152	CF, (ARD25T470J)	470 $\Omega$ , $\pm 5\%$ , 1/4W	
R153	MF, (RN14K2E4750D)	475 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R154	CF, (ARD25T330J)	330 $\Omega$ , $\pm 5\%$ , 1/4W	
R155	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R156	CF, (ARD25T121J)	120 $\Omega$ , $\pm 5\%$ , 1/4W	
R157	CF, (ARD25T121J)	120 $\Omega$ , $\pm 5\%$ , 1/4W	
R158	MF, (RN14K2E5110D)	511 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R159	MF, (RN14K2E4750D)	475 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R160	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W	
R161	Var, MF, (RJ-6P 100 $\Omega$ )	100 $\Omega$ , 1/2W	Q'ty 0 or 1
R162	Not assigned		
R163	Var, MF, (RJ-6P 1k $\Omega$ )	1k $\Omega$ , 1/2W	Q'ty 0 or 1
R164	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W	Q'ty 0 or 1
R165	MF, (RN14K2E7501D)	7.5k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R166	MF, (RN14K2E4870D)	487 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R167	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R168	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W	
R169	Var, MF, (RJ-6P 1k $\Omega$ )	1k $\Omega$ , 1/2W	
R170	MF, (RN14K2E4021D)	4.02k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R171	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R172	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R173	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R174	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R175	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R176	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R177	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	Q'ty 0 or 1
R178	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	Q'ty 0 or 1
R179	MF, (RN14K2E1002D)	10k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R180	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R181	MF, (RN14K2E1002D)	10k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R182	Var, MF, (RJ-6P 20k $\Omega$ )	20k $\Omega$ , 1/2W	
R183	MF, (RN14K2E3320D)	332 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R184	MF, (RN14K2E1580D)	158 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R185	MF, (RN14K2E1503D)	150k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R186	MF, (RN14K2E9091D)	9.09k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R187	CF, (ARD25T470J)	470 $\Omega$ , $\pm 5\%$ , 1/4W	
R188	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R189	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm 5\%$ , 1/4W	
R190	Not assigned		
R191	Not assigned		
R192	Not assigned		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
R193	Var, MF, (RJ-6P 20k )	20k $\Omega$ , 1/2W	
R194	MF, (RN14K2E1002D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R195	MF, (RN14K2E1002D)	100k $\Omega$ , $\pm 5\%$ , 1/4W	
R196	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R197	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W	
R198	MF, (RN14K2E1501D)	1.5k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R199	MF, (RN14K2E4990D)	499 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R200	MF, (RN14K2E4990D)	499 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R201	Single in-line array, (IHR-8-472JA)	4.7k $\Omega$ x 8, 1/8W	
R202	Single in-line array, (IHR-6-472JA)	4.7k $\Omega$ x 6, 1/8W	
R203	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W	
R204	Not assigned		
R205	Not assigned		
R206	MF, (RN14K2E * D)	100 $\Omega$ to 10k $\Omega$ , $\pm 0.5\%$ , 1/4W	Q'ty 0 or 1, *
R207	MF, (RN14K2E * D)	100 $\Omega$ to 10k $\Omega$ , $\pm 0.5\%$ , 1/4W	Q'ty 0 or 1, *
R208	MF, (RN14K2E * D)	100 $\Omega$ to 10k $\Omega$ , $\pm 0.5\%$ , 1/4W	Q'ty 0 or 1, *
R209	Not assigned		
R210	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R211	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R212	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R213	Var, MF, (RJ-6P 2k )	2k $\Omega$ , 1/2W	
R214	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R215	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R216	Var, MF, (RJ-6P 5k )	5k $\Omega$ , 1/2W	
R217	MF, (RN14K2E3321D)	3.32k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R218	MF, (RN14K2E3321D)	3.32k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R219	MF, (RN14K2E3321D)	3.32k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R220	MF, (RN14K2E3321D)	3.32k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R221	MF, (RN14K2E6040D)	604 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R222	MF, (RN14K2E1501D)	1.50k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R223	Not assigned		
R224	MF, (RN14K2E2491D)	2.49k $\Omega$ , $\pm 0.5\%$ , 1/4W	Q'ty 0 or 1
R225	MF, (RN14K2E2491D)	2.49k $\Omega$ , $\pm 0.5\%$ , 1/4W	Q'ty 0 or 1

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Elect, (CE04W1A470)	47 $\mu$ F, $\pm 20\%$ , 10V	
C 2	Elect, (CA92C-1C-1R000-R53)	1 $\mu$ F, $\pm 20\%$ , 16V	
C 3	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C 4	Not assigned		
C 5	Not assigned		
C 6	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C 7	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C 8	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C 9	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C10	Elect, (CE04W1A470)	47 $\mu$ F, $\pm 20\%$ , 10V	
C11	Elect, (CA92C-1C-1R000-R53)	1 $\mu$ F, $\pm 20\%$ , 16V	
C12	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C13	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C14	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C15	Elect, (CA92C-1C-1R000-R53)	1 $\mu$ F, $\pm 20\%$ , 16V	
C16	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C17	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C18	Elect, (CA92C-1C-1R000-R53)	1 $\mu$ F, $\pm 20\%$ , 16V	
C19	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C20	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm 20\%$ , 50V	
C21	Plast, (ECO-P1 203F2)	0.02 $\mu$ F, $\pm 1\%$ , 100V	
C22	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C23	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C24	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C25	Elect, (CA92C-1C-1R000-R53)	1 $\mu$ F, $\pm 20\%$ , 16V	
C26	Elect, (CA92C-1C-1R000-R53)	1 $\mu$ F, $\pm 20\%$ , 16V	
C27	Plast, (ECO-MH103K2)	0.01 $\mu$ F, $\pm 10\%$ , 50V	
C28	Cer, (CK924C1H102M)	1000pF, $\pm 20\%$ , 50V	
C29	Not assigned		
C30	Not assigned		
C31	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C32	Not assigned		
C33	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V	
C34	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V	
C35	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V	
C36	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V	
C37	Not assigned		
C38	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C39	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C40	Not assigned		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING	NOTE
C41	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C42	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C43	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V	
C44	Not assigned		
C45	Not assigned		
C46	Not assigned		
C47	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C48	Cer, (CK924C1H471J)	470pF, $\pm 5\%$ , 50V	
C49	Cer, (CK924C1H472M)	4700pF, $\pm 20\%$ , 50V	
C50	Elect, (CE04W1A470)	47 $\mu$ F, $\pm 20\%$ , 10V	
C51	Elect, (CE04W1A470)	47 $\mu$ F, $\pm 20\%$ , 10V	
C52	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C53	Plast, (ECO-MH103K2)	0.01 $\mu$ F, $\pm 10\%$ , 50V	
C54	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C55	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C56	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C57	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C58	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C59	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C60	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C61	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C62	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
C63	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V	
J 1	Connector, (8301-064-290)		
J 2	Connector, (U-PA1019)		
J 3	Connector, (HIF3-40P-2.54DS)		
J 4	Connector, (HIF3-34P-2.54DS)		
J 5	Connector, (DF1-5P-2.5DSA)		
J 6	Not assigned		
J 7	Connector, (DF1-2P-2.5DSA)		
J 8	Connector, (DF1-5P-2.5DSA)		
J 9	Not assigned		
J10	Not assigned		
L 1	Coil, (LF8-220K)	22.H	
L 2	Coil, (LF8-101K)	100.H	
L 3	Coil, (LF8-101K)	100.H	

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING	NOTE
L 4	Coil, (LF8-220K)	220H	
L 5	Coil, (LF8-221K)	220H	
Q 1	IC, (74LS04)		
Q 2	IC, (74LS00)		
Q 3	IC, (LPD780C-1)		
Q 4	Di, (1S953)		
Q 5	IC, (TC40H139P)		
Q 6	IC, (EPROM16Kx8-25N)		
Q 7	IC, (EPROM16Kx8-25N)		
Q 8	IC, (EPROM16Kx8-25N)		
Q 9	IC, (TCS565PL-15)		
Q10	Not assigned		
Q11	IC, (TC40H139P)		
Q12	IC, (TC40H138P)		
Q13	IC, (TC40H032P)		
Q14	Not assigned		
Q15	Not assigned		
Q16	IC, (TC40H374P)		
Q17	IC, (TC40H374P)		
Q18	Not assigned		
Q19	Not assigned		
Q20	IC, (74LS244)		
Q21	IC, (TC40H244P)		
Q22	IC, (74LS05)		
Q23	IC, (TC40H032P)		
Q24	IC, (74LS107A)		
Q25	IC, (74LS290)		
Q26	IC, (TC40H374P)		
Q27	IC, (74F191PC)		
Q28	IC, (74F191PC)		
Q29	IC, (74S00)		
Q30	Not assigned		
Q31	IC, (TC40H244P)		
Q32	IC, (TC4044BP)		
Q33	IC, (TC40H374P)		
Q34	IC, (uPC803C)		
Q35	IC, (TC4053BP)		
Q36	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q37	Not assigned		
Q38	IC, (LPD8279C-2)		
Q39	Not assigned		
Q40	Di, breakdown, (1S252)	5.9 to 6.5V, 250mW	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING	NOTE
Q41	IC, (TC40H374P)		
Q42	Not assigned		
Q43	IC, (TC40H374P)		
Q44	IC, (TC40H374P)		
Q45	IC, (TC4526BP)		
Q46	IC, (TC4526BP)		
Q47	IC, (TC4526BP)		
Q48	IC, (TC4526BP)		
Q49	IC, (TC4520BP)		
Q50	IC, (TC4516BP)		
Q51	IC, (TC40H157P)		
Q52	IC, (TC40H157P)		
Q53	IC, (TC40H157P)		
Q54	IC, (HA17012PB)		
Q55	IC, (TC4011BP)		
Q56	IC, (TC4023BP)		
Q57	IC, (TC4071BP)		
Q58	IC, (TC4049BP)		
Q59	IC, (TC4053BP)		
Q60	IC, (TC4053BP)		
Q61	IC, (HA17083P)		
Q62	IC, (uPC258C)		
Q63	IC, (HA17901G)		
Q64	IC, (TC4052BP)		
Q65	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q66	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q67	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q68	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW	
Q69	Tr, (2SA1151)		
Q70	IC, (TC40H245P)		
Q71	IC, (TC40H367P)		
Q72	IC, (TC40H367P)		
Q73	Tr, (2SC2718)		
Q74	Di, breakdown, (RD9.1EB)	8.5 to 9.6V, 400mW	
Q75	IC, (74LS123)		
R 1	CF, (ARD25T103J)	10k $\pm$ 5%, 1/4W	
R 2	CF, (ARD25T471J)	470k $\pm$ 5%, 1/4W	
R 3	Single in-line array, (IHR-10-103JA)	10k $\times$ 10, 1/8W	
R 4	Single in-line array, (IHR-8-472JA)	4.7k $\times$ 8, 1/8W	
R 5	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R 6	Not assigned		
R 7	CF, (ARD25T103J)	10k $\pm$ 5%, 1/4W	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING	NOTE
R 8	CF, (ARD25T103J)	10k $\pm$ 5%, 1/4W	
R 9	Not assigned		
R10	CF, (ARD25T102J)	1k $\pm$ 5%, 1/4W	
R11	Var, MF, (RJ-6P 1k $\times$ )	1k $\times$ 1/2W	
R12	MF, (RN14K2E4991D)	4.99k $\pm$ 0.5%, 1/4W	
R13	Not assigned		
R14	Not assigned		
R15	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R16	Not assigned		
R17	MF, (RN14K2E6041D)	6.04k $\pm$ 0.5%, 1/4W	
R18	MF, (RN14K2E5491D)	5.49k $\pm$ 0.5%, 1/4W	
R19	Var, MF, (RJ-6P 1k $\times$ )	1k $\times$ 1/2W	
R20	Var, MF, (RJ-6P 100k $\times$ )	100k $\times$ 1/2W	
R21	MF, (RN14K2E1001D)	1.0k $\pm$ 0.5%, 1/4W	
R22	CF, (ARD25T221J)	220k $\pm$ 5%, 1/4W	
R23	CF, (ARD25T222J)	2.2k $\pm$ 5%, 1/4W	
R24	Not assigned		
R25	CF, (ARD25T104J)	100k $\pm$ 5%, 1/4W	
R26	CF, (ARD25T104J)	100k $\pm$ 5%, 1/4W	
R27	Single in-line array, (IHR-8-103JA)	10k $\times$ 8, 1/8W	
R28	CF, (ARD25T103J)	10k $\pm$ 5%, 1/4W	
R29	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R30	CF, (ARD25T392J)	3.9k $\pm$ 5%, 1/4W	
R31	MF, (RN14K2E2001D)	2.0k $\pm$ 0.5%, 1/4W	
R32	MF, (RN14K2E1002D)	10.0k $\pm$ 0.5%, 1/4W	
R33	MF, (RN14K2E2430D)	243 $\pm$ 0.5%, 1/4W	
R34	Var, MF, (RJ-6P 1k $\times$ )	1k $\times$ 1/2W	
R35	MF, (RN14K2E4421D)	4.42k $\pm$ 0.5%, 1/4W	
R36	MF, (RN14K2E2001D)	2.0k $\pm$ 0.5%, 1/4W	
R37	MF, (RN14K2E1001D)	1.0k $\pm$ 0.5%, 1/4W	
R38	MF, (RN14K2E4021D)	4.02k $\pm$ 0.5%, 1/4W	
R39	MF, (RN14K2E1001D)	1.00k $\pm$ 0.5%, 1/4W	
R40	Not assigned		
R41	Not assigned		
R42	Not assigned		
R43	Not assigned		
R44	Not assigned		
R45	CF, (ARD25T102J)	1.0k $\pm$ 5%, 1/4W	
R46	Not assigned		
R47	MF, (RN14K2E5111D)	5.11k $\pm$ 0.5%, 1/4W	
R48	Not assigned		
R49	CF, (ARD25T103J)	10k $\pm$ 5%, 1/4W	
R50	CF, (ARD25T222J)	2.2k $\pm$ 5%, 1/4W	
R51	MF, (RN14K2E1503D)	150k $\pm$ 0.5%, 1/4W	
R52	MF, (RN14K2E7872D)	78.7k $\pm$ 0.5%, 1/4W	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING	NOTE
R53	MF, (RN14K2E4022D)	40.2k $\pm$ 0.5%, 1/4W	
R54	MF, (RN14K2E2002D)	20.0k $\pm$ 0.5%, 1/4W	
R55	MF, (RN14K2E1002D)	10.0k $\pm$ 0.5%, 1/4W	
R56	MF, (RN14K2E4991D)	4.99k $\pm$ 0.5%, 1/4W	
R57	MF, (RN14K2E1691D)	1.69k $\pm$ 0.5%, 1/4W	
R58	MF, (RN14K2E6191D)	6.19k $\pm$ 0.5%, 1/4W	
R59	CF, (ARD25T222J)	2.2k $\pm$ 5%, 1/4W	
R60	CF, (ARD25T332J)	3.3k $\pm$ 5%, 1/4W	
R61	MF, (RN14K2E2001D)	2.0k $\pm$ 0.5%, 1/4W	
R62	MF, (RN14K2E3012D)	30.1k $\pm$ 0.5%, 1/4W	
R63	MF, (RN14K2E2001D)	2.0k $\pm$ 0.5%, 1/4W	
R64	MF, (RN14K2E3012D)	30.1k $\pm$ 0.5%, 1/4W	
Z 1	XTAL OSC, (TCO-707F)	16MHz	

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z27 DISPLAY CONTROL				
CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (CE04W1A470)	47 $\mu$ F, $\pm 20\%$ , 10V		
C 2	Cer, (CC924CH1H101J)	100pF, $\pm 5\%$ , 50V		
C 3	Cer, (CC924CH1H101J)	100pF, $\pm 5\%$ , 50V		
C 4	Cer, (CC45CH1H330JY)	33pF, $\pm 5\%$ , 50V		
C 5	Cer, (CC924CH1H331J)	330pF, $\pm 5\%$ , 50V		
C 6	Cer, (CC924CH1H510J)	51pF, $\pm 5\%$ , 50V		
C 7	Cer, (CK924CH222M)	2200pF, $\pm 20\%$ , 50V		
C 8	Cer, (CK924CH1H472M)	4700pF, $\pm 20\%$ , 50V		
C 9	Cer, (CC924CH1H * J)	470 to 1000pF, $\pm 5\%$ , 50V		Q'ty 0 or 1, *
C10	Cer, (CC924CH1H101J)	100pF, $\pm 5\%$ , 50V		
C11	Cer, (CC45CH1H220JY)	22pF, $\pm 5\%$ , 50V		
C12	Elect, (CA92C-1C-1R000-R53)	1 $\mu$ F, $\pm 20\%$ , 16V		
C13	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C14	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C15	Elect, (CA92C-1C-1R000-R53)	1 $\mu$ F, $\pm 20\%$ , 16V		
C16	Elect, (CA92C-1C-1R000-R53)	1 $\mu$ F, $\pm 20\%$ , 16V		
C17	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V		
C18	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C19	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C20	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C21	Cer, (CC924CH1H100D)	10pF, $\pm 0.5\mu$ F, 50V		
C22	Cer, (CC924CH1H100D)	10pF, $\pm 0.5\mu$ F, 50V		
C23	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C24	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C25	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C26	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C27	Cer, (CC924CH1H180J)	18pF, $\pm 0.5\mu$ F, 50V		
C28	Plast, (ECQ-M1H102K2)	1000pF, $\pm 10\%$ , 50V		
C29	Plast, (ECQ-M1H472K2)	4700pF, $\pm 10\%$ , 50V		
C30	Not assigned			
C31	Cer, (CC924CH1H331J)	330pF, $\pm 5\%$ , 50V		
C32	Elect, (CE04W1A470)	47 $\mu$ F, $\pm 20\%$ , 10V		
C33	Cer, (CC924CH1H330JY)	33pF, $\pm 5\%$ , 50V		
C34	Cer, (CK924CH222M)	2200pF, $\pm 20\%$ , 50V		
C35	Cer, (CC924CH1H270J)	27pF, $\pm 5\%$ , 50V		
C36	Cer, (CC924CH1H471J)	470pF, $\pm 5\%$ , 50V		
C37	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C38	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C39	Not assigned			
C40	Cer, (CK924CH1H102M)	1000pF, $\pm 20\%$ , 50V		
C41	Cer, (CK924CH1H102M)	1000pF, $\pm 20\%$ , 50V		
C42	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C43	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C44	Not assigned			
C45	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z27 DISPLAY CONTROL				
CKT REF	DESCRIPTION	RATING		NOTE
C46	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V		
C47	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V		
C48	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V		
C49	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V		
C50	Elect, (CE04W1E470)	47 $\mu$ F, $\pm 20\%$ , 25V		
C51	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V		
C52	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V		
C53	Elect, (CE04W1A101)	100 $\mu$ F, $\pm 20\%$ , 10V		
C54	Not assigned			
C55	Not assigned			
C56	Not assigned			
C57	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C58	Cer, (CC924CH1H680J)	68pF, $\pm 5\%$ , 50V		
C59	Cer, (CC924CH1H680J)	68pF, $\pm 5\%$ , 50V		
C60	Not assigned			
C61	Cer, (CSC300K)	30pF $\times$ 2, $\pm 10\%$ , 50V		
C62	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C63	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C64	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C65	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C66	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C67	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V		
C68	Not assigned			
C69	Not assigned			
C70	Not assigned			
C71	Not assigned			
C72	Not assigned			
C73	Cer, (CC45CH1H330JY)	33pF, $\pm 5\%$ , 50V		
C74	Cer, (CC45CH1H100DY)	10pF, $\pm 0.5\mu$ F, 50V		
C75	Cer, (CC924CH1H560J)	56pF, $\pm 5\%$ , 50V		
J 1	Connector, (8301-064-290)			
J 2	Connector, (U-PA1019)			
J 3	Connector, (DP1-8P-2.5DS)			
L 1	Coil, (LF8-101K)	100 $\mu$ H		
L 2	Coil, (LF8-101K)	100 $\mu$ H		
L 3	Coil, (LF8-220K)	22 $\mu$ H		
Q 1	IC, (TC40H004P)			
Q 2	IC, (TC40H393P)			

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z27 DISPLAY CONTROL				
CKT REF	DESCRIPTION	RATING		NOTE
Q 3	IC, (74HC393)			
Q 4	IC, (TC40H393P)			
Q 5	IC, (74LS03)			
Q 6	IC, (TC40H020P)			
Q 7	IC, (TC40H157P)			
Q 8	IC, (TC40H367P)			
Q 9	IC, (TC40H244P)			
Q10	IC, (TC40H244P)			
Q11	IC, (TC40H074P)			
Q12	IC, (74LS123)			
Q13	IC, (TC5556P1-15)			
Q14	Tr, (PAL12L6Q14)			
Q15	IC, (74LS123)			
Q16	IC, (TC40H374P)			
Q17	IC, (74LS123)			
Q18	IC, (74LS123)			
Q19	IC, (TC40H000P)			
Q20	IC, (TC40H074P)			
Q21	Tr, (PAL12H6Q21B)			
Q22	IC, (PB426D)			
Q23	IC, (TC40H175P)			
Q24	Tr, (PAL12L6Q24)			
Q25	IC, (74LS153)			
Q26	IC, (TC4001BP)			
Q27	IC, (TC40H032P)			
Q28	Not assigned			
Q29	Not assigned			
Q30	IC, (MBM2764-25)			
Q31	IC, (TC40H174P)			
Q32	IC, (PC803C)			
Q33	IC, (74LS257)			
Q34	IC, (74LS257)			
Q35	IC, (74LS75)			
Q36	IC, (TC40H157P)			
Q37	IC, (TC40H367P)			
Q38	IC, (TC40H244P)			
Q39	Not assigned			
Q40	IC, (TC40H004P)			
Q41	IC, (TC40H000P)			
Q42	IC, (TC40H010P)			
Q43	Tr, (PAL16L2Q43B)			
Q44	IC, (TC40H032P)			
Q45	Not assigned			
Q46	Not assigned			
Q47	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z27 DISPLAY CONTROL				
CKT REF	DESCRIPTION	RATING		NOTE
Q48	Di, breakdown, (1S252)	5.9 to 6.5V, 250mW		
Q49	IC, (PC258C)			
Q50	Not assigned			
Q51	IC, (TC40H074P)			
Q52	IC, (TC40H374P)			
Q53	IC, (TC40H374P)			
Q54	IC, (MX7530JN)			
Q55	IC, (MX7530JN)			
Q56	Not assigned			
Q57	IC, (PC813C)			
Q58	IC, (PC813C)			
Q59	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW		
Q60	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW		
Q61	IC, (PC78L05)			
Q62	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW		
Q63	IC, (TC4052BP)			
Q64	IC, (PC258C)			
Q65	IC, (PC804C)			
Q66	IC, (TC4053BP)			
Q67	IC, (TC4053BP)			
Q68	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q69	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q70	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q71	Di, (1S953)			
Q72	Di, (1S953)			
Q73	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q74	IC, (PC803C)			
Q75	IC, (TC4053BP)			
Q76	Not assigned			
Q77	Di, (1S953)			
Q78	Not assigned			
Q79	Not assigned			
Q80	Not assigned			
Q81	Tr, (2SC2718)			
Q82	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q83	Tr, (2SA1151)			
Q84	Di, breakdown, (RD13EB)	12.4 to 14.1V, 400mW		
Q85	IC, (TC40H174P)			
Q86	IC, (TC40H148P)			
Q87	Not assigned			
Q88	Not assigned			
Q89	Not assigned			
Q90	Not assigned			
Q91	Not assigned			
Q92	Not assigned			

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING	NOTE
Q93	IC, (TC40H010P)		
Q94	IC, (TC40H0151P)		
Q95	IC, (TC40H032P)		
Q96	Not assigned		
Q97	IC, (74LS123)		
R 1	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R 2	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W	
R 3	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm 5\%$ , 1/4W	
R 4	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm 5\%$ , 1/4W	
R 5	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W	
R 6	Single in-line array, (IHR-4-102JA)	1k $\Omega$ x 4, 1/8W	
R 7	Single in-line array, (IHR-8-103JA)	10k $\Omega$ x 8, 1/8W	
R 8	Single in-line array, (IHR-8-472JA)	4.7k $\Omega$ x 8, 1/8W	
R 9	Single in-line array, (IHR-8-472JA)	4.7k $\Omega$ x 8, 1/8W	
R10	CF, (ARD25T221J)	220 $\Omega$ , $\pm 5\%$ , 1/4W	
R11	CF, (ARD25T183J)	18k $\Omega$ , $\pm 5\%$ , 1/4W	
R12	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R13	CF, (ARD25T47J)	3.3k to 10k $\Omega$ , $\pm 5\%$ , 1/4W	Q'ty 0 or 1, *
R14	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm 5\%$ , 1/4W	
R15	MF, (RN14K2E4022D)	40.2k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R16	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R17	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R18	MF, (RN14K2E3321D)	3.32k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R19	MF, (RN14K2E4022D)	40.2k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R20	MF, (RN14K2E2002D)	20.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R21	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R22	MF, (RN14K2E3321D)	3.32k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R23	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W	
R24	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W	
R25	Single in-line array, (IHR-8-103JA)	1k $\Omega$ x 8, 1/4W	
R26	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R27	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R28	Not assigned		
R29	CF, (ARD25T391J)	390 $\Omega$ , $\pm 5\%$ , 1/4W	
R30	MF, (RN14K2E7150D)	715 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R31	MF, (RN14K2E3010D)	301 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R32	MF, (RN14K2E6041D)	6.04k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R33	MF, (RN14K2E3651D)	3.65k $\Omega$ , $\pm 0.5\%$ , 1/4W	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING	NOTE
R34	Var, MF, (RJ-6S 1k )	1k $\Omega$ , 1/2W	
R35	Var, MF, (RJ-6S 1k )	1k $\Omega$ , 1/2W	
R36	Var, MF, (RJ-6S 20k )	20k $\Omega$ , 1/2W	
R37	Var, MF, (RJ-6S 2k )	2k $\Omega$ , 1/2W	
R38	Not assigned		
R39	Not assigned		
R40	Not assigned		
R41	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R42	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R43	Var, MF, (RJ-6S 500 )	500 $\Omega$ , 1/2W	
R44	MF, (RN14K2E1001D)	1.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R45	MF, (RN14K2E9391D)	9.39k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R46	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R47	MF, (RN14K2E3320D)	332 $\Omega$ , $\pm 0.5\%$ , 1/4W	
R48	MF, (RN14K2E8252D)	82.5k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R49	MF, (RN14K2E4751D)	4.75k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R50	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R51	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R52	MF, (RN14K2E1002D)	10.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R53	MF, (RN14K2E8061D)	8.06k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R54	MF, (RN14K2E1243D)	124k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R55	MF, (RN14K2E4022D)	40.2k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R56	CF, (ARD25T821J)	820 $\Omega$ , $\pm 5\%$ , 1/4W	
R57	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W	
R58	MF, (RN14K2E7501D)	7.50k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R59	MF, (RN14K2E3482D)	34.8k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R60	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R61	MF, (RN14K2E3921D)	3.92k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R62	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R63	MF, (RN14K2E9092D)	90.9k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R64	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R65	MF, (RN14K2E8252D)	82.5k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R66	Not assigned		
R67	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W	
R68	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W	
R69	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W	
R70	Not assigned		
R71	CF, (ARD25T153J)	15k $\Omega$ , $\pm 5\%$ , 1/4W	
R72	MF, (RN14K2E7501D)	7.50k $\Omega$ , $\pm 0.5\%$ , 1/4W	
R73	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R74	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W	
R75	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W	
R76	CF, (ARD25T * J)	39k to 100k $\Omega$ , $\pm 5\%$ , 1/4W	Q'ty 0 or 1, *
R77	CF, (ARD25T333J)	33k $\Omega$ , $\pm 5\%$ , 1/4W	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING	NOTE
R78	Not assigned		
R79	CF, (ARD25T * J)	4.7k to 10k $\Omega$ , $\pm 5\%$ , 1/4W	Q'ty 0 or 1, *
R80	CF, (ARD25T334J)	330k $\Omega$ , $\pm 5\%$ , 1/4W	
R81	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R82	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W	
R83	CF, (ARD25T102J)	1.0k $\Omega$ , $\pm 5\%$ , 1/4W	
R84	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W	
R85	Single in-line array, (IHR-6-103JA)	10k $\Omega$ x 6, 1/8W	
R86	CF, (ARD25T105J)	1.0M $\Omega$ , $\pm 5\%$ , 1/4W	
R87	CF, (ARD25T683J)	68k $\Omega$ , $\pm 5\%$ , 1/4W	Q'ty 0 or 1
R88	CF, (ARD25T822J)	8.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R89	CF, (ARD25T822J)	8.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R90	CF, (ARD25T822J)	8.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R91	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W	
R92	CF, (ARD25T333J)	33k $\Omega$ , $\pm 5\%$ , 1/4W	
R93	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W	
R94	CF, (ARD25T152J)	1.5k $\Omega$ , $\pm 5\%$ , 1/4W	
R95	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W	
R96	CF, (ARD25T512J)	5.1k $\Omega$ , $\pm 5\%$ , 1/4W	
X 1	CSA 4.80MG		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z28 LOW LOCAL 1

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Not assigned		
C 2	Cer, (CC732CH1H100D)	10pF, $\pm 0.5\%$ , 50V	
C 3	Cer, (CC732CK1H0R5C)	0.5pF, $\pm 0.25\%$ , 50V	
C 4	Cer, (CC732CJ1H030C)	3pF, $\pm 0.25\%$ , 50V	
C 5	Not assigned		
C 6	Cer, (CK924C1H103M)	0.1 $\mu$ F, $\pm 20\%$ , 50V	
C 7	Cer, (CC732CH1H220J)	22pF, $\pm 5\%$ , 50V	
C 8	Cer, (CC732CH1H220J)	22pF, $\pm 5\%$ , 50V	
C 9	Plast, (EC04W1V220)	0.22 $\mu$ F, $\pm 5\%$ , 50V	
C10	Cer, (CC732CK1H010C)	1pF, $\pm 0.25\%$ , 50V	
C11	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C12	Cer, (CK734B1H104K)	0.1 $\mu$ F, $\pm 10\%$ , 50V	
C13	Elect, (CE04W1V220)	22 $\mu$ F, $\pm 20\%$ , 35V	
C14	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C15	Cer, (CK924C1H1M)	2200pF to 0.1 $\mu$ F, $\pm 20\%$ , 50V	Q'ty 0 or 1*
C16	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C17	Cer, (CC732CJ1H030C)	3pF, $\pm 0.25\%$ , 50V	
C18	Cer, (CC732CJ1H030C)	3pF, $\pm 0.25\%$ , 50V	
C19	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C20	Cer, (CC732CK1H010C)	1pF, $\pm 0.25\%$ , 50V	
C21	Cer, (CK732B1H102K)	1000pF, $\pm 20\%$ , 50V	
C22	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C23	Elect, (CE04W1V220)	22 $\mu$ F, $\pm 20\%$ , 35V	
C24	Cer, (C4532Y5V1H1052)	1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V	
C25	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C26	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C27	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C28	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C29	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C30	Elect, (CE04W1V220)	22 $\mu$ F, $\pm 20\%$ , 35V	
C31	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C32	Cer, (CK737F1H1052)	1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V	
C33	Cer, (CC732CJ1H030C)	3pF, $\pm 0.25\%$ , 50V	
C34	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C35	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C36	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C37	Cer, (C4532Y5V1H1052)	1 $\mu$ F, $\pm 80\%$ to $\pm 20\%$ , 50V	
C38	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C39	Cer, (CK732B1H102K)	1000pF, $\pm 10\%$ , 50V	
C40	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C41	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm 20\%$ , 50V	
C42	Cer, (CC732CJ1H030C)	3pF, $\pm 0.25\%$ , 50V	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z28 LOW LOCAL 1

CKT REF	DESCRIPTION	RATING		NOTE
L 1	Not assigned			
L 2	Not assigned			
L 3	Not assigned			
L 4	Coil, (MLF3216DR10K)	0.1 $\mu$ H		
L 5	Coil, (MLF3216DR10K)	0.1 $\mu$ H		
L 6	Coil, (MLF3216DR10K)	0.1 $\mu$ H		
L 7	Coil, (MLF3216DR10K)	0.1 $\mu$ H		
L 8	Coil, (MLF3216DR10K)	0.1 $\mu$ H		
L 9	Coil, (SP0408-6R8K)	6.8 $\mu$ H		
Q 1	Tr, (2SC2149)			
Q 2	Di, (1SV164)			
Q 3	Di, (1SV164)			
Q 4	Di, (1SV164)			
Q 5	Di, (1SV164)			
Q 6	Tr, (2SC2367)			
Q 7	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q 8	Not assigned			
Q 9	Not assigned			
Q 10	Tr, (2SC2367)			
Q 11	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q 12	IC, ( $\mu$ PB561C)			
Q 13	IC, ( $\mu$ PC1651G)			
Q 14	Not assigned			
Q 15	Not assigned			
Q 16	Not assigned			
Q 17	Not assigned			
Q 18	IC, ( $\mu$ PC1656C)			
R 1	MF, (RM73B2B470JD)	47 $\Omega$ , $\pm$ 5%, 1/8W		
R 2	MF, (RM73B2B100JD)	10 $\Omega$ , $\pm$ 5%, 1/8W		
R 3	MF, (RM73B2B100JD)	10 $\Omega$ , $\pm$ 5%, 1/8W		
R 4	Not assigned			
R 5	CF, (ARD25T272J)	2.7k $\Omega$ , $\pm$ 5%, 1/4W		
R 6	CF, (ARD25T272J)	2.7k $\Omega$ , $\pm$ 5%, 1/4W		
R 7	CF, (ARD25T331J)	330 $\Omega$ , $\pm$ 5%, 1/4W		
R 8	CM, (RM73B2B470JD)	47 $\Omega$ , $\pm$ 5%, 1/4W		
R 9	CF, (ARD25T821J)	820 $\Omega$ , $\pm$ 5%, 1/4W		
R 10	CF, (ARD25T821J)	820 $\Omega$ , $\pm$ 5%, 1/4W		
R 11	MF, (RM73B100JD)	10 $\Omega$ , $\pm$ 5%, 1/8W		
R 12	MF, (RM73B2B102JD)	1k $\Omega$ , $\pm$ 5%, 1/8W		
R 13	MF, (RM73B2B271JD)	270 $\Omega$ , $\pm$ 5%, 1/8W		
R 14	MF, (RM73B2B202JD)	22 $\Omega$ , $\pm$ 5%, 1/8W		
R 15	MF, (RM73B2B271JD)	270 $\Omega$ , $\pm$ 5%, 1/8W		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z28 LOW LOCAL 1

CKT REF	DESCRIPTION	RATING		NOTE
R16	MF, (RM73B2B100JD)	10 $\Omega$ , $\pm$ 5%, 1/8W		
R17	MF, (RM73B2B102JD)	1k $\Omega$ , $\pm$ 5%, 1/8W		
R18	CF, (ARD25T821J)	820 $\Omega$ , $\pm$ 5%, 1/4W		
R19	CF, (ARD25T821J)	820 $\Omega$ , $\pm$ 5%, 1/4W		
R20	MF, (RM73B2B271JD)	270 $\Omega$ , $\pm$ 5%, 1/8W		
R21	MF, (RM73B2B220JD)	22 $\Omega$ , $\pm$ 5%, 1/8W		
R22	MF, (RM73B2B271JD)	270 $\Omega$ , $\pm$ 5%, 1/8W		
R23	MF, (RM73B2B101JD)	100 $\Omega$ , $\pm$ 5%, 1/8W		
R24	MF, (RM73B2B680JD)	68 $\Omega$ , $\pm$ 5%, 1/8W		
R25	MF, (RM73B2B101JD)	100 $\Omega$ , $\pm$ 5%, 1/8W		
R26	Not assigned			
R27	Not assigned			
R28	Not assigned			
R29	Not assigned			
R30	CF, (ARD25T121J)	120 $\Omega$ , $\pm$ 5%, 1/4W		
R31	MF, (RM73B2B100JD)	10 $\Omega$ , $\pm$ 5%, 1/8W		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z29 LOW LOCAL 2

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CH1471J)	470pF, $\pm$ 0.5pF, 50V		
C 2	Cer, (CC732CH1471J)	470pF, $\pm$ 5%, 50V		
C 3	Cer, (CC732CH1471J)	470pF, $\pm$ 5%, 50V		
C 4	Cer, (CC732CH1471J)	470pF, $\pm$ 5%, 50V		
C 5	Cer, (CC732CJ1H030C)	3pF, $\pm$ 0.25pF, 50V		
C 6	Cer, (CC732CJ1H030C)	3pF, $\pm$ 0.25pF, 50V		
C 7	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm$ 20%, 50V		
C 8	Cer, (CK924C1H104M)	0.1 $\mu$ F, $\pm$ 20%, 50V		
C 9	Elect, (CE04W1A101)	100 $\mu$ F, $\pm$ 20%, 10V		
C 10	Not assigned			
C 11	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V		
C 12	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V		
C 13	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V		
C 14	Cer, (CK924C1H103M)	0.01 $\mu$ F, $\pm$ 20%, 50V		
C 15	Cer, (CK737F1H105Z)	1 $\mu$ F, $\pm$ 80/-20%, 50V		
C 16	Not assigned			
C 17	Cer, (CC732CJ1H030C)	3pF, $\pm$ 0.25pF, 50V		
C 18	Elect, (CE04W1V4R7)	4.7 $\mu$ F, $\pm$ 20%, 35V		
C 19	Elect, (CE04W1V4R7)	4.7 $\mu$ F, $\pm$ 20%, 35V		
J 1	Not assigned			
J 2	Not assigned			
J 3	Not assigned			
J 4	Not assigned			
J 5	Not assigned			
J 6	Connector, (DF1-5P-2.5DS)			
K 1	Relay, (NR-SD-12V)			
K 2	Relay, (NR-SD-12V)			
L 1	Coil, (MLF3216DR10K)	0.1 $\mu$ H		
L 2	Coil, (MLF3216DR10K)	0.1 $\mu$ H		
Q 1	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q 2	Tr, (2SC2367)			
Q 3	Not assigned			
Q 4	Tr, (DTC143EF)			
Q 5	Di, (1S953)			
Q 6	Not assigned			
Q 7	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q 8	IC, ( $\mu$ PC251C)			
Q 9	Tr, (2SC2721)			
Q 10	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		

( ): Manufacturer's part number

\* : Selected at factory

44W83957

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Parts List : Z29 LOW LOCAL 2

CKT REF	DESCRIPTION	RATING		NOTE
Q11	Not assigned			
Q12	Tr, (2SA1154)			
Q13	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q14	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q15	Di, (1S953)			
Q16	Tr, (DTC143EF)			
Q17	IC, ( $\mu$ PC1651G)			
Q18	IC, ( $\mu$ PC14308H)			
Q19	Tr, (2SC2721)			
Q20	Di, breakdown, (RD5.1E(3))	4.95 to 5.2V, 400mW		
Q21	Di, (1S953)			
R 1	CF, (ARD25T821J)	820 $\Omega$ , $\pm$ 5%, 1/4W		
R 2	CF, (ARD25T821J)	820 $\Omega$ , $\pm$ 5%, 1/4W		
R 3	MF, (RM73B2B102JD)	1k $\Omega$ , $\pm$ 0.5%, 1/8W		
R 4	Not assigned			
R 5	Not assigned			
R 6	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm$ 5%, 1/4W		
R 7	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm$ 5%, 1/4W		
R 8	CF, (ARD25T331J)	330 $\Omega$ , $\pm$ 5%, 1/4W		
R 9	CF, (ARD25T331J)	330 $\Omega$ , $\pm$ 5%, 1/4W		
R 10	CF, (ARD25T471J)	470 $\Omega$ , $\pm$ 5%, 1/4W		
R 11	CF, (ARD25T331J)	330 $\Omega$ , $\pm$ 5%, 1/4W		
R 12	CF, (ARD25T331J)	330 $\Omega$ , $\pm$ 5%, 1/4W		
R 13	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm$ 5%, 1/4W		
R 14	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm$ 5%, 1/4W		
R 15	Not assigned			
R 16	CF, (ARD25T153J)	15k $\Omega$ , $\pm$ 5%, 1/4W		
R 17	CF, (ARD25T153J)	15k $\Omega$ , $\pm$ 5%, 1/4W		
R 18	CF, (ARD25T153J)	15k $\Omega$ , $\pm$ 5%, 1/4W		
R 19	Not assigned			
R 20	MF, (RS1FB 10 J)	10 $\Omega$ , $\pm$ 5%, 1W		
R 21	CF, (ARD25T220J)	22 $\Omega$ , $\pm$ 5%, 1/4W		
Z 1	M14-ML (R.K)			

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Elect, (CE04W1V220)	220F, ±20%, 35V	
C 2	Elect, (CE04W1V220)	220F, ±20%, 35V	
C 3	Elect, (CE04W1V220)	220F, ±20%, 35V	
C 4	M Plast, (CF922N2A104K)	0.1μF, ±10%, 100V	
C 5	M Plast, (CF922N2A104K)	0.1μF, ±10%, 100V	
C 6	Not assigned		
C 7	Not assigned		
C 8	Elect, (CE04W1E101)	100μF, ±20%, 25V	
C 9	Elect, (CE04W1E101)	100μF, ±20%, 25V	
C10	Not assigned		
C11	Plast, (ECO-M1H222KZ)	2200pF, ±10%, 50V	
C12	Plast, (ECO-M1H222KZ)	2200pF, ±10%, 50V	
C13	Elect, (KX100VB-3.3)	3.3μF, 100V	
C14	Elect, (KX100VB-3.3)	3.3μF, 100V	
C15	Elect, (KX100VB-3.3)	3.3μF, 100V	
C16	Elect, (KX100VB-3.3)	3.3μF, 100V	
C17	M Plast, (CF922N2A104K)	0.1μF, ±10%, 100V	
C18	Plast, (ECO-M1H103KZ)	0.01μF, ±10%, 50V	
C19	Not assigned		
C20	Cer, (DE1710R472K1kV)	4700pF, ±10%, 1kV	
C21	Cer, (DE1710R472K1kV)	4700pF, ±10%, 1kV	
C22	Cer, (DE1710R472K1kV)	4700pF, ±10%, 1kV	
C23	Cer, (DE2110R472K2kV)	4700pF, ±10%, 2kV	
C24	Cer, (DE1710R222K3kV)	2200pF, ±10%, 3kV	
C25	Cer, (DE1710R222K3kV)	2200pF, ±10%, 3kV	
C26	Cer, (CC45CH1H101JY)	100pF, ±5%, 50V	
C27	Not assigned		
C28	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V	
C29	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V	
C30	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V	
C31	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V	
C32	Cer, (CC45CH1H100DY)	10pF, ±0.5pF, 50V	
J 1	Connector, (PI011-05M)		
J 2	Connector, (DPI-8P-2.5DSA)		
J 3	Connector, (PI011-02M)		
J 4	Connector, (PI011-08M)		
J 5	Connector, (PI011-07M)		
L 1	Coil, (LH1-471K)	470μH	
L 2	Coil, (LH1-471K)	470μH	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING	NOTE
Q 1	IC, (PC14312H)		
Q 2	IC, (PC16312H)		
Q 3	Tr, (2SA1151)		
Q 4	Tr, (2SC2718)		
Q 5	Tr, (2SC2718)		
Q 6	Tr, (2SC2718)		
Q 7	Tr, (2SC2718)		
Q 8	Tr, (2SC1279S)		
Q 9	Tr, (2SC1279S)		
Q10	Tr, (2SC507)		
Q11	Tr, (2SC507)		
Q12	Not assigned		
Q13	Tr, (2SC2718)		
Q14	Tr, (2SC2718)		
Q15	Tr, (2SC1279S)		
Q16	Tr, (2SC1279S)		
Q17	Tr, (2SC1279S)		
Q18	Tr, (2SC1279S)		
Q19	Not assigned		
Q20	Not assigned		
Q21	Di, (1S953)		
Q22	Tr, (2SC2718)		
Q23	Tr, (2SC2718)		
Q25	Tr, (2SA1151)		
Q25	Photocoupler, (PS2006B)		
Q26	Di, (1S953)		
Q27	Di, (1S953)		
Q28	Tr, (2SD297(M))		
Q29	Tr, (2SD297(M))		
Q30	Not assigned		
Q31	Rectifier, (1S1834)		
Q32	Rectifier, (1S1834)		
Q33	Rectifier, (1S1834)		
Q34	Rectifier, (1S1834)		
Q35	Tr, (2SA639S)		
Q36	Tr, (2SA639S)		
Q37	Tr, (2SA639S)		
Q38	Tr, (2SA639S)		
Q39	Tr, (2SA639S)		
Q40	Tr, (2SA639S)		
Q41	Not assigned		
Q42	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q43	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q44	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING	NOTE
Q45	Tr, (2SC1279S)		
Q46	Rectifier, (ES01F)		
Q47	Rectifier, (ES01F)		
Q48	Rectifier, (ES01F)		
R 1	CF, (ARD25T222J)	2.2k, ±5%, 1/4W	
R 2	Not assigned		
R 3	Not assigned		
R 4	CF, (ARD25T333J)	33k, ±5%, 1/4W	
R 5	CF, (ARD25T333J)	33k, ±5%, 1/4W	
R 6	Not assigned		
R 7	Not assigned		
R 8	Not assigned		
R 9	Not assigned		
R10	Not assigned		
R11	Not assigned		
R12	Var, MF, (RJ-6P 1k)	1k, 1/2W	
R13	Var, MF, (RJ-6P 5k)	5k, 1/2W	
R14	CF, (ARD25T152J)	1.5k, ±5%, 1/4W	
R15	CF, (ARD25T682J)	6.8k, ±5%, 1/4W	
R16	CF, (ARD25T332J)	3.3k, ±5%, 1/4W	
R17	CF, (ARD25T151J)	150, ±5%, 1/4W	
R18	CF, (ARD25T821J)	820, ±5%, 1/4W	
R19	Var, MF, (RJ-6P 5k)	5k, 1/2W	
R20	Not assigned		
R21	CF, (ARD25T222J)	2.2k, ±5%, 1/4W	
R22	CF, (ARD25T102J)	1k, ±5%, 1/4W	
R23	CF, (ARD25T821J)	820, ±5%, 1/4W	
R24	CF, (ARD25T331J)	330, ±5%, 1/4W	
R25	CF, (ARD25T103J)	10k, ±5%, 1/4W	
R26	CF, (ARD25T103J)	10k, ±5%, 1/4W	
R27	CF, (ARD25T821J)	820, ±5%, 1/4W	
R28	CF, (ARD25T821J)	820, ±5%, 1/4W	
R29	CF, (ARD25T105J)	1M, ±5%, 1/4W	
R30	CF, (ARD25T105J)	1M, ±5%, 1/4W	
R31	Not assigned		
R32	CF, (ARD25T104J)	100k, ±5%, 1/4W	
R33	CF, (ARD25T104J)	100k, ±5%, 1/4W	
R34	CF, (ARD25T562J)	5.6k, ±5%, 1/4W	
R35	CF, (ARD25T562J)	5.6k, ±5%, 1/4W	
R36	Not assigned		
R37	Not assigned		
R38	CF, (ARD25T103J)	10k, ±5%, 1/4W	
R39	Var, MF, (RJ-6P 10k)	10k, 1/2W	
R40	Not assigned		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING	NOTE
R41	CF, (ARD25T102J)	1k, ±5%, 1/4W	
R42	CF, (ARD25T332J)	3.3k, ±5%, 1/4W	
R43	CF, (ARD25T152J)	1.5k, ±5%, 1/4W	
R44	CF, (ARD25T103J)	10k, ±5%, 1/4W	
R45	CF, (ARD25T103J)	10k, ±5%, 1/4W	
R46	CF, (ARD25T821J)	820, ±5%, 1/4W	
R47	CF, (ARD25T821J)	820, ±5%, 1/4W	
R48	CF, (ARD25T105J)	1M, ±5%, 1/4W	
R49	CF, (ARD25T105J)	1M, ±5%, 1/4W	
R50	Not assigned		
R51	CF, (ARD25T154J)	150k, ±5%, 1/4W	
R52	CF, (ARD25T154J)	150k, ±5%, 1/4W	
R53	CF, (ARD25T823J)	82k, ±5%, 1/4W	
R54	CF, (ARD25T823J)	82k, ±5%, 1/4W	
R55	Not assigned		
R56	CF, (ARD25T102J)	1k, ±5%, 1/4W	
R57	CF, (ARD25T123J)	12k, ±5%, 1/4W	
R58	CF, (ARD25T183J)	18k, ±5%, 1/4W	
R59	Not assigned		
R60	Not assigned		
R61	CF, (ARD25T102J)	1k, ±5%, 1/4W	
R62	CF, (ARD25T103J)	10k, ±5%, 1/4W	
R63	Var, MF, (RJ-6P 2k)	2k, 1/2W	
R64	CF, (ARD25T332J)	3.3k, ±5%, 1/4W	
R65	CF, (ARD25T332J)	3.3k, ±5%, 1/4W	
R66	CF, (ARD25T103J)	10k, ±5%, 1/4W	
R67	CF, (ARD25T103J)	10k, ±5%, 1/4W	
R68	Not assigned		
R69	Not assigned		
R70	Not assigned		
R71	Not assigned		
R72	Not assigned		
R73	CF, (ARD25T101J)	100, ±5%, 1/4W	
R74	CF, (ARD25T101J)	100, ±5%, 1/4W	
R75	CF, (ARD25T103J)	10k, ±5%, 1/4W	
R76	CF, (ARD25T471J)	470, ±5%, 1/4W	
R77	CF, (ARD25T153J)	15k, ±5%, 1/4W	
R78	CF, (ARD25T * J)	33k to 47k, ±5%, 1/4W	
R79	CF, (ARD25T562J)	5.6k, ±5%, 1/4W	
R80	Not assigned		
R81	CF, (ARD25T102J)	1k, ±5%, 1/4W	
R82	CF, (ARD25T222J)	2.2k, ±5%, 1/4W	
R83	CF, (ARD25T332J)	3.3k, ±5%, 1/4W	

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING		NOTE
R84	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W		
R85	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W		
R86	CF, (ARD25T471J)	470 $\Omega$ , $\pm 5\%$ , 1/4W		
R87	CF, (ARD25T224J)	220k $\Omega$ , $\pm 5\%$ , 1/4W		
R88	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R89	WW, (RH1HVS1.2M $\Omega$ J)	1.2M $\Omega$ , $\pm 5\%$ , 1W		
R90	WW, (RH2HVS2.2M $\Omega$ J)	2.2M $\Omega$ , $\pm 5\%$ , 2W		
R91	Var, MF, (RJ-13SR 10k $\Omega$ )	10k $\Omega$ , 1/2W		
R92	Var, MF, (RJ-13SR 1k $\Omega$ )	1k $\Omega$ , 1/2W		
R93	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W		
R94	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W		
R95	Var, MF, (RJ-6P 500k $\Omega$ )	500k $\Omega$ , 1/2W		
R96	CF, (ARD25T473J)	47k $\Omega$ , $\pm 5\%$ , 1/4W		
R97	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R98	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R99	Var, MF, (RJ-6P 500k $\Omega$ )	500k $\Omega$ , 1/2W		
R100	Not assigned			
R101	Var, MF, (RJ-13SR 500k $\Omega$ )	500k $\Omega$ , 1/2W		
T 1	Trans, (439T23554)			
Z 1	RECTIFIER, (MSL4532)			

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z32 SWITCHING REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (CE02W1J222)	2200 $\mu$ F, $\pm 20\%$ , 63V		
C 2	Elect, (CE02W1J332)	3300 $\mu$ F, $\pm 20\%$ , 63V		
C 3	Elect, (CE02W1J222)	2200 $\mu$ F, $\pm 20\%$ , 63V		
C 4	Cer, (CK45B1H102KV)	1000pF, $\pm 10\%$ , 50V		
C 5	Elect, (CE04C1J101)	100 $\mu$ F, $\pm 20\%$ , 63V		
C 6	Elect, (CE04C1J101)	100 $\mu$ F, $\pm 20\%$ , 63V		
C 7	Elect, (CE04C1E221)	220 $\mu$ F, $\pm 20\%$ , 25V		
C 8	Not assigned			
C 9	Elect, (CE04W1E221)	220 $\mu$ F, $\pm 20\%$ , 25V		
C10	Elect, (CE04W1E221)	220 $\mu$ F, $\pm 20\%$ , 25V		
C11	Not assigned			
C12	Not assigned			
C13	Not assigned			
C14	Elect, (CE04C1J101)	100 $\mu$ F, $\pm 20\%$ , 63V		
C15	Elect, (CE04C1A331)	330 $\mu$ F, $\pm 20\%$ , 10V		
C16	Elect, (CE04C1A331)	330 $\mu$ F, $\pm 20\%$ , 10V		
C17	Elect, (CE04C1A331)	330 $\mu$ F, $\pm 20\%$ , 10V		
C18	Elect, (CE04W1A221)	220 $\mu$ F, $\pm 20\%$ , 10V		
C19	Elect, (CE04W1A221)	220 $\mu$ F, $\pm 20\%$ , 10V		
C20	Cer, (CC924CH1H471J)	470pF, $\pm 5\%$ , 50V		
C21	Not assigned			
C22	Not assigned			
C23	Elect, (CE04C1J101)	100 $\mu$ F, $\pm 20\%$ , 63V		
C24	Elect, (CE04C1J101)	100 $\mu$ F, $\pm 20\%$ , 63V		
C25	Elect, (CE04C1E221)	220 $\mu$ F, $\pm 20\%$ , 25V		
C26	Elect, (CE04C1E221)	220 $\mu$ F, $\pm 20\%$ , 25V		
C27	Elect, (CE04W1E221)	220 $\mu$ F, $\pm 20\%$ , 25V		
C28	Elect, (CE04W1E221)	220 $\mu$ F, $\pm 20\%$ , 25V		
C29	Cer, (CC924CH1H101J)	100pF, $\pm 5\%$ , 50V		
C30	Cer, (CC924CH1H471J)	470pF, $\pm 5\%$ , 50V		
C31	Not assigned			
C32	M Plast, (CF922N2A105K)	1 $\mu$ F, $\pm 10\%$ , 100V		
C33	M Plast, (CF922N2A105K)	1 $\mu$ F, $\pm 10\%$ , 100V		
C34	M Plast, (CF922N2A105K)	1 $\mu$ F, $\pm 10\%$ , 100V		
C35	Cer, (CC924CH1H101J)	100pF, $\pm 5\%$ , 50V		
C36	Cer, (CC924CH1H101J)	100pF, $\pm 5\%$ , 50V		
C37	Cer, (CC924CH1H331J)	330pF, $\pm 5\%$ , 50V		
C38	Elect, (CE04W1J100)	10 $\mu$ F, $\pm 20\%$ , 63V		
C39	Cer, (CK924F1H104Z)	0.1 $\mu$ F, $\pm 80\%$ , -20%, 50V		
F 1	Fuse, TM, (T 2A 250V)	2A		
F 2	Fuse, TM, (T 1A 250V)	1A		
F 3	Fuse, TM, (T 1.6A 250V)	1.6A		

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z32 SWITCHING REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector, (U-PB1521)			
J 2	Connector, (PI011-05M)			
J 3	Connector, (PI011-05M)			
J 4	Connector, (PI011-12M)			
J 5	Connector, (PI011-02M)			
J 6	Connector, (DF1-5P-2.5DSA)			
J 7	Not assigned			
J 8	Connector, (PI011-04M)			
L 1	Coil, (SF-T10-40)			
L 2	Not assigned			
L 3	Coil, (MS-2405)			
L 4	Coil, (SF-T10-50)			
L 5	Coil, (SF-T10-50)			
L 6	Not assigned			
L 7	Coil, (SF-T12-50)			
L 8	Not assigned			
L 9	Coil, (MS-1210)			
L10	Coil, (MS-0503)			
L11	Coil, (MS0503)			
L12	Not assigned			
L13	Coil, (SF-T10-40)			
L14	Not assigned			
L15	Coil, (MS-2405)			
L16	Coil, (SF-T10-50)			
L17	Coil, (SF-T10-50)			
L18	Coil, (LH1-471K)			
L19	Coil, (LH1-471K)			
M 1	Timer, (TM-0)			
Q 1	Di, breakdown, (1S252)	5.9 to 6.5V, 250mW		
Q 2	IC, (.PC271C)			
Q 3	Tr, (2SC2718)			
Q 4	Tr, (2SA1154)			
Q 5	Tr, (2SC2750)			
Q 6	Rectifier, (56K20)			
Q 7	Not assigned			
Q 8	Rectifier, (RB-402)			
Q 9	Rectifier, (RB-402)			
Q10	Rectifier, (RB-402)			
Q11	Di, breakdown, (1S252)	5.9 to 6.5V, 250mW		
Q12	IC, (.PC271C)			
Q13	Tr, (2SC2718)			

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z32 SWITCHING REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
Q14	Tr, (2SA1154)			
Q15	Tr, (2SC2750)			
Q16	Rectifier, (S10SC4M)			
Q17	Di, breakdown, (1S252)	5.9 to 6.5V, 250mW		
Q18	IC, (.PC271C)			
Q19	Tr, (2SA1151)			
Q20	Tr, (2SA1151)			
Q21	Tr, (2SC2721)			
Q22	Tr, (2SC2750)			
Q23	Rectifier, (56K20)			
Q24	Not assigned			
Q25	Not assigned			
Q26	Not assigned			
Q27	Not assigned			
Q28	Not assigned			
Q29	Not assigned			
Q30	Not assigned			
Q31	Not assigned			
Q32	IC, (TL7705CP)			
R 1	CF, (ARD25T122J)	1.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R 2	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W		
R 3	Var, MF, (RJ-6P 1k $\Omega$ )	1k $\Omega$ , 1/2W		
R 4	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R 5	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W		
R 6	CF, (ARD25T564J)	560k $\Omega$ , $\pm 5\%$ , 1/4W		
R 7	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R 8	Not assigned			
R 9	CF, (ARD25T223J)	22k $\Omega$ , $\pm 5\%$ , 1/4W		
R10	CF, (ARD25T151J)	150 $\Omega$ , $\pm 5\%$ , 1/4W		
R11	Not assigned			
R12	CF, (ARD25T222J)	2.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R13	Not assigned			
R14	Not assigned			
R15	Not assigned			
R16	Not assigned			
R17	Not assigned			
R18	CF, (ARD25T122J)	1.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R19	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W		
R20	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W		
R21	CF, (ARD25T684J)	680k $\Omega$ , $\pm 5\%$ , 1/4W		
R22	CF, (ARD25T562J)	5.6k $\Omega$ , $\pm 5\%$ , 1/4W		
R23	CF, (ARD25T681J)	680 $\Omega$ , $\pm 5\%$ , 1/4W		
R24	CF, (ARD25T822J)	8.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R25	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W		

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : 232 SWITCHING REGULATOR

CKT REF	DESCRIPTION	RATING	NOTE
R26	WW, (ERF-2SKR20)	0.2W, ±10%, 2W	
R27	WW, (ERF-2SKR20)	0.2W, ±10%, 2W	
R28	WW, (ERF-2SKR20)	0.2W, ±10%, 2W	
R29	CF, (ARD25T12J)	1.2kΩ, ±5%, 1/4W	
R30	Var, MF, (RJ-6P 1k.)	1kΩ, 1/2W	
R31	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W	
R32	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W	
R33	CF, (ARD25T101J)	100Ω, ±5%, 1/4W	
R34	CF, (ARD25T334J)	330kΩ, ±5%, 1/4W	
R35	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R36	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R37	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R38	CF, (ARD25T681J)	680Ω, ±5%, 1/4W	
R39	CF, (ARD25T223J)	22kΩ, ±5%, 1/4W	
R40	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W	
R41	WW, (ERF-2SKR10)	0.1W, ±10%, 2W	
R42	WW, (ERF-2SKR10)	0.1W, ±10%, 2W	
R43	Not assigned		
R44	Not assigned		
R45	CF, (ARD25T123J)	12kΩ, ±5%, 1/4W	
R46	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W	
R47	CF, (ARD25T105J)	1MΩ, ±5%, 1/4W	
R48	Not assigned		
R49	Not assigned		
R50	Not assigned		
R51	WW, (ERF-2SKR20)	0.2W, ±10%, 2W	
R52	WW, (ERF-2SKR10)	0.1W, ±10%, 2W	
R53	WW, (ERF-2SKR20)	0.2W, ±10%, 2W	
R54	Not assigned		
R55	CF, (ARD25T473J)	47kΩ, ±5%, 1/4W	
R56	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R57	Not assigned		
R58	Not assigned		
R59	Not assigned		
R60	Not assigned		
R61	Not assigned		
R62	Not assigned		
R63	Not assigned		
R64	Not assigned		
R65	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W	
R66	Var, MF, (RJ-6P 1kΩ)	1kΩ, 1/2W	
R67	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W	
R68	CF, (ARD25T273J)	27kΩ, ±5%, 1/4W	
R69	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R70	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R71	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R72	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	
R73	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W	

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List: 233 CONNECTION BOARD

CKT REF	DESCRIPTION	RATING	NOTE
J 1	Connector, (PI021-10M)		
J 2	Connector, (U-SA1001)		
J 3	Connector, (U-SA1001)		

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : 234 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Elect, (CA92C-1C-1R000-R53)	1.1F, -20%, 16V	
C 2	Not assigned		
C 3	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C 4	Not assigned		
C 5	Not assigned		
C 6	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C 7	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C 8	Elect, (CE04W1V47)	4.7μF, ±20%, 35V	
C 9	Not assigned		
C10	Not assigned		
C11	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C12	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C13	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C14	Elect, (CE04W1E470)	47μF, ±20%, 25V	
C15	Elect, (CA92C-1C-1R000-R53)	1.1F, -20%, 16V	
C16	Elect, (CA92C-1C-1R000-R53)	1.1F, -20%, 16V	
C17	Elect, (CA92C-1C-1R000-R53)	1.1F, -20%, 16V	
C18	Not assigned		
C19	Cer, (CK924C1H473M)	0.047μF, ±20%, 50V	
C20	Cer, (CK924C1H473M)	0.047μF, ±20%, 50V	
C21	Cer, (CK924C1H102J)	1000pF, ±5%, 50V	
C22	Cer, (CK924C1H102J)	220pF, ±5%, 50V	
C23	Cer, (CK924C1H102J)	330pF, ±5%, 50V	
C24	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C25	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C26	Elect, (CA92C-1C-1R000-R53)	1.1F, -20%, 16V	
C27	Plast, (ECQ-M1H222KZ)	1000pF, ±10%, 50V	
C28	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C29	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C30	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C31	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C32	Not assigned		
C33	Elect, (CA92C-1C-1R000-R53)	1.1F, -20%, 16V	
C34	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C35	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C36	Cer, (CK924C1H150J)	15pF, ±5%, 50V	
C37	Cer, (CK924C1H150J)	20pF, ±5%, 50V	
C38	Plast, (ECQ-M1H102KZ)	1000pF, ±10%, 50V	

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : 234 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING	NOTE
C39	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C40	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C41	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C42	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C43	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C44	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C45	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C46	Cer, (CK924C1H150J)	15pF, ±5%, 50V	
C47	Cer, (CK924C1H150J)	20pF, ±5%, 50V	
C48	Plast, (ECQ-M1H102KZ)	1000pF, ±10%, 50V	
C49	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C50	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C51	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C52	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C53	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C54	Cer, (CK924C1H222M)	2200pF, ±20%, 50V	
C55	Plast, (ECQ-M1H222KZ)	2200pF, ±10%, 50V	
C56	Cer, (CK924C1H151J)	150pF, ±5%, 50V	
C57	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C58	Not assigned		
C59	Plast, (ECQ-M1H222KZ)	2200pF, ±10%, 50V	
C60	Not assigned		
C61	Elect, (CE04W1A101)	100F, ±20%, 10V	
C62	Tant, (CS-E1D2R2M)	2.2F, ±20%, 20V	
C63	Tant, (CS-E1D2R2M)	2.2F, ±20%, 20V	
C64	Tant, (CS-E1D2R2M)	2.2F, ±20%, 20V	
C65	Tant, (CS-E1D2R2M)	2.2F, ±20%, 20V	
C66	Tant, (CS-E1D2R2M)	2.2F, ±20%, 20V	
C67	Plast, (ECQ-M1H223KZ)	0.022F, ±10%, 50V	
C68	Plast, (ECQ-M1H223KZ)	0.022F, ±10%, 50V	
C69	Plast, (ECQ-M1H223KZ)	0.022F, ±10%, 50V	
C70	Plast, (ECQ-M1H223KZ)	0.022F, ±10%, 50V	
C71	Plast, (ECQ-M1H223KZ)	0.022F, ±10%, 50V	
C72	Not assigned		
C73	Cer, (CK924C1H472M)	4700pF, ±20%, 50V	
C74	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C75	Not assigned		
C76	Elect, (CE04W1E101)	100F, ±20%, 25V	
C77	Elect, (CE04W1E101)	100F, ±20%, 25V	
C78	Elect, (CE04W1V100)	10F, ±20%, 35V	
C79	Elect, (CE04W1V100)	10F, ±20%, 35V	
C80	Not assigned		
C81	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C82	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	
C83	Cer, (CK924F1H104Z)	0.1F, +80/-20%, 50V	

( ): Manufacturer's part number  
 \* : Selected at factory

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Parts List : Z34 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING	NOTE
C84	Not assigned		
C85	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C86	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C87	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C88	Not assigned		
C89	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C90	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C91	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C92	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C93	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C94	Not assigned		
C95	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C96	Not assigned		
C97	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C98	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C99	Not assigned		
C100	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C101	Not assigned		
C102	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C103	Not assigned		
C104	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C105	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C106	Not assigned		
C107	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C108	Cer, (CK45D1H103MY)	0.01 $\mu$ F, $\pm$ 20%, 50V	
C109	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C110	Not assigned		
C111	Cer, (CK924F1H104Z)	0.1 $\mu$ F, +80/-20%, 50V	
C112	Elect, (CE04CLE220)	22 $\mu$ F, $\pm$ 20%, 25V	
J 1	Connector, (8301-064-290)		
J 2	Connector, (57LE-GP-IB)		
J 3	Connector, (HIF3P-34P-2.54DS)		
J 4	Connector, (DF1-8P-2.5DSA)		
J 5	Connector, (DF1-10P-2.5DSA)		
J 6	Not assigned		
J 7	Connector, (DF1-2P-2.5DSA)		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z34 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING	NOTE
L 1	Coil, (LF8-101K)	100 $\mu$ H	
L 2	Coil, (LF8-101K)	100 $\mu$ H	
L 3	Coil, (LF8-470K)	47 $\mu$ H	
L 4	Coil, (LF8-470K)	47 $\mu$ H	
Q 1	Not assigned		
Q 2	IC, ( $\mu$ PD8259AC-2)		
Q 3	Not assigned		
Q 4	Not assigned		
Q 5	Not assigned		
Q 6	Not assigned		
Q 7	Not assigned		
Q 8	Not assigned		
Q 9	IC, (74LS245)		
Q10	Not assigned		
Q11	IC, (74LS74A)		
Q12	IC, ( $\mu$ PD8253C-2)		
Q13	Not assigned		
Q14	IC, (74LS74A)		
Q15	IC, (EPROM32Kx8-20C)		
Q16	IC, (TC5565PL-15)		
Q17	Di, (1S953)		
Q18	IC, (74LS37)		
Q19	Not assigned		
Q20	IC, (74LS155)		
Q21	IC, (74LS08)		
Q22	Not assigned		
Q23	Not assigned		
Q24	IC, (74LS32)		
Q25	Not assigned		
Q26	IC, (74LS04)		
Q27	IC, ( $\mu$ PD780C-1)		
Q28	Not assigned		
Q29	IC, (74LS14)		
Q30	Tr, (PAL1018Q30C)		
Q31	IC, (74LS138)		
Q32	IC, (TC5565PL-15)		
Q33	Not assigned		
Q34	Not assigned		
Q35	Not assigned		
Q36	IC, (TC40H367P)		
Q37	IC, (TC40H367P)		
Q38	IC, (TC40H245P)		
Q39	IC, (TC40H243P)		
Q40	IC, (TC40H175P)		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z34 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING	NOTE
Q41	IC, (TC5514AP-2)		
Q42	IC, (TC40H074P)		
Q43	IC, (74LS244)		
Q44	IC, (74LS244)		
Q45	IC, ( $\mu$ PD8255AC-2)		
Q46	IC, ( $\mu$ PD7210C)		
Q47	IC, (SN75160AN)		
Q48	IC, (SN75161AN)		
Q49	Not assigned		
Q50	Not assigned		
Q51	IC, ( $\mu$ PD8255AC-2)		
Q52	IC, (TC40H004P)		
Q53	IC, (TC40H027P)		
Q54	IC, (TC40H008P)		
Q55	IC, (74LS123)		
Q56	IC, (74LS123)		
Q57	IC, (ADC574AJH)		
Q58	IC, (TC40H074P)		
Q59	IC, (TC40H032P)		
Q60	IC, (TC40H021P)		
Q61	IC, (TC4044BP)		
Q62	IC, (TC40H008P)		
Q63	IC, (TC40H155P)		
Q64	IC, (NJU201AD)		
Q65	IC, (LF356BN)		
Q66	IC, (.PC649D)		
Q67	Not assigned		
Q68	IC, (TC40H174P)		
Q69	IC, (TC40H174P)		
Q70	Not assigned		
Q71	IC, (HA3-2525-5)		
Q72	Di, (1S953)		
Q73	Di, (1S957)		
Q74	Di, (1S957)		
Q75	IC, (LF356BN)		
Q76	IC, (NJU201AD)		
Q77	Di, (1S953)		
Q78	IC, (.PC272C)		
Q79	Not assigned		
Q80	Not assigned		
Q81	IC, (HA3-2525-5)		
Q82	Di, (1S953)		
Q83	Di, (1S957)		
Q84	Di, (1S957)		
Q85	IC, (LF356BN)		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z34 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING	NOTE
Q86	Not assigned		
Q87	IC, (.PC803C)		
Q88	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q89	Di, (1S953)		
Q90	Di, (1S955)		
Q91	Not assigned		
Q92	Not assigned		
Q93	Not assigned		
Q94	IC, (TC40H032P)		
Q95	Di, (1S953)		
Q96	IC, (TC4081BP)		
Q97	IC, (TC4030BP)		
Q98	IC, (TC4030BP)		
Q99	Not assigned		
Q100	Not assigned		
Q101	Tr, (2SA1154)		
Q102	Tr, (2SA1154)		
Q103	Tr, (2SA1154)		
Q104	Tr, (2SA1154)		
Q105	Tr, (2SA1154)		
Q106	Tr, (2SC2721)		
Q107	Tr, (2SC2721)		
Q108	Tr, (2SC2721)		
Q109	Tr, (2SC2721)		
Q110	Tr, (2SC2721)		
Q111	IC, (TA78)		
Q112	IC, (TA57)		
Q113	IC, (.PA54HA)		
Q114	IC, (.PA54HA)		
Q115	Not assigned		
Q116	Not assigned		
Q117	Not assigned		
Q118	Tr, (PAL12L6Q118)		
Q119	Not assigned		
Q120	Not assigned		
Q121	Not assigned		
Q122	IC, (TC40H243P)		
Q123	Not assigned		
Q124	IC, (.PC1093J)		
Q125	Di, breakdown, (RD2.0EB)	1.88 to 2.12V, 400mW	
Q126	Di, breakdown, (RD2.0EB)	1.88 to 2.12V, 400mW	
Q127	IC, (.PC7011C)		
Q128	IC, (NE5532)		

( ): Manufacturer's part number

\* : Selected at factory

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Parts List : Z34 DIGITAL MEMORY / GP-IB				
CKT REF	DESCRIPTION	RATING		NOTE
R 1	Single in-line array, (IHR-8-103JA)	10k $\Omega$ x 8,1/8W		
R 2	Single in-line array, (IHR-8-103JA)	10k $\Omega$ x 8,1/8W		
R 3	Single in-line array, (IHR-8-472JA)	4.7k $\Omega$ x 8,1/8W		
R 4	Single in-line array, (IHR-8-472JA)	4.7k $\Omega$ x 8,1/8W		
R 5	Not assigned			
R 6	Not assigned			
R 7	Single in-line array, (IHR-8-222JA)	2.2k $\Omega$ x 8,1/8W		
R 8	Not assigned			
R 9	Single in-line array, (IHR-8-103JA)	10k $\Omega$ x 8,1/8W		
R10	Single in-line array, (IHR-8-103JA)	10k $\Omega$ x 8,1/8W		
R11	CF, (ARD25T31J)	330 $\Omega$ , $\pm 5\%$ , 1/4W		
R12	Single in-line array, (RRS-4-220JB)	22 $\Omega$ , 1/8W		
R13	Single in-line array, (IHR-8-222JA)	2.2k $\Omega$ x 8,1/8W		
R14	Single in-line array, (IHR-6-222JA)	2.2k $\Omega$ x 6,1/8W		
R15	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W		
R16	Not assigned			
R17	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R18	Not assigned			
R19	Single in-line array, (IHR-8-103JA)	10k $\Omega$ x 8,1/8W		
R20	MF, (RN14K2E49R9D)	49.9k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R21	Single in-line array, (IHR-8-682JA)	6.8k $\Omega$ x 8,1/8W		
R22	Var, MF, (RJ-6P 20K $\Omega$ )	20K $\Omega$ , 1/2W		
R23	Not assigned			
R24	MF, (RN14K2E6041D)	6.04k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R25	MF, (RN14K2E2001D)	2.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R26	Not assigned			
R27	CF, (ARD25T123J)	12k $\Omega$ , $\pm 5\%$ , 1/4W		
R28	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R29	CF, (ARD25T822J)	8.2k $\Omega$ , $\pm 5\%$ , 1/4W		
R30	CF, (ARD25T105J)	100k $\Omega$ , $\pm 5\%$ , 1/4W		
R31	MF, (RN14K2E1001D)	1.0k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R32	MF, (RN14K2E9530D)	953 $\Omega$ , $\pm 0.5\%$ , 1/4W		
R33	Var, MF, (RJ-6P 100 $\Omega$ )	100 $\Omega$ , 1/2W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z34 DIGITAL MEMORY / GP-IB				
CKT REF	DESCRIPTION	RATING		NOTE
R34	Var, MF, (RJ-6P 20k $\Omega$ )	20k $\Omega$ , 1/2W		
R35	CF, (ARD25T683J)	68k $\Omega$ , $\pm 5\%$ , 1/4W		
R36	Not assigned			
R37	MF, (RN14K2E4640D)	464 $\Omega$ , $\pm 0.5\%$ , 1/4W		
R38	MF, (RN14K2E1002D)	10k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R39	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W		
R40	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W		
R41	MF, (RN14K2E1001D)	1k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R42	MF, (RN14K2E9530D)	953 $\Omega$ , $\pm 0.5\%$ , 1/4W		
R43	Var, MF, (RJ-6P 100 $\Omega$ )	100 $\Omega$ , 1/2W		
R44	Var, MF, (RJ-6P 20k $\Omega$ )	20k $\Omega$ , 1/2W		
R45	CF, (ARD25T683J)	68k $\Omega$ , $\pm 5\%$ , 1/4W		
R46	Not assigned			
R47	MF, (RN14K2E4640D)	464 $\Omega$ , $\pm 0.5\%$ , 1/4W		
R48	MF, (RN14K2E1002D)	10k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R49	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W		
R50	Not assigned			
R51	MF, (RN14K2E1002D)	10k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R52	MF, (RN14K2E2002D)	20k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R53	MF, (RN14K2E2002D)	20k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R54	CF, (ARD25T * J)	10 to 100 $\Omega$ , $\pm 5\%$ , 1/4W		Q'ty 0 or 1, *
R55	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W		
R56	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W		
R57	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W		
R58	Not assigned			
R59	Not assigned			
R60	Not assigned			
R61	MF, (RN14K2E1002D)	10k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R62	MF, (RN14K2E2002D)	20k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R63	MF, (RN14K2E2002D)	20k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R64	CF, (ARD25T * J)	10 to 100 $\Omega$ , $\pm 5\%$ , 1/4W		Q'ty 0 or 1, *
R65	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W		
R66	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W		
R67	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W		
R68	Not assigned			
R69	Not assigned			
R70	CF, (ARD25T105J)	1M $\Omega$ , $\pm 5\%$ , 1/4W		
R71	CF, (ARD25T105J)	1M $\Omega$ , $\pm 5\%$ , 1/4W		
R72	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R73	CF, (ARD25T104J)	100k $\Omega$ , $\pm 5\%$ , 1/4W		
R74	CF, (ARD25T333J)	33k $\Omega$ , $\pm 5\%$ , 1/4W		
R75	Var, MF, (RJ-6P 20k $\Omega$ )	20k $\Omega$ , 1/2W		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z34 DIGITAL MEMORY / GP-IB				
CKT REF	DESCRIPTION	RATING		NOTE
R76	CF, (ARD25T334J)	330k $\Omega$ , $\pm 5\%$ , 1/4W		
R77	MF, (RN14K2E5111D)	5.11k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R78	Var, MF, (RJ-6P 20K $\Omega$ )	20K $\Omega$ , 1/2W		
R79	MF, (RN14K2E4991D)	4.99k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R80	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R81	CF, (ARD25T101J)	100 $\Omega$ , $\pm 5\%$ , 1/4W		
R82	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W		
R83	MF, (RN14K2E5112D)	51.1k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R84	CF, (ARD25T103J)	10k $\Omega$ , $\pm 5\%$ , 1/4W		
R85	CF, (ARD25T682J)	6.8k $\Omega$ , $\pm 5\%$ , 1/4W		
R86	Single in-line array, (IHR-6-103JB)	10k $\Omega$ x 6,1/8W		
R87	Single in-line array, (IHR-6-104JA)	100k $\Omega$ x 6,1/8W		
R88	Not assigned			
R89	Not assigned			
R90	Not assigned			
R91	Not assigned			
R92	Not assigned			
R93	Not assigned			
R94	Not assigned			
R95	CF, (ARD25T472J)	4.7k $\Omega$ , $\pm 5\%$ , 1/4W		
R96	Not assigned			
R97	CF, (ARD25T561J)	560 $\Omega$ , $\pm 5\%$ , 1/4W		
R98	Single in-line array, (RRS-6-472JB)	4.7k $\Omega$ x 6,1/8W		
R99	MF, (RN14K2E1132D)	11.3k $\Omega$ , $\pm 0.5\%$ , 1/4W		
R100	Var, MF, (RJ-6P100k $\Omega$ )	100k $\Omega$ , 1/2W		
R101	Single in-line array, (RRS-6-472JB)	4.7k $\Omega$ x 6,1/8W		
R102	Not assigned			
R103	Not assigned			
R104	Not assigned			
R105	Not assigned			
R106	Not assigned			
R107	CF, (ARD25T221J)	220 $\Omega$ , $\pm 5\%$ , 1/4W		
S 1	Dip switch, (44S70581)			
Z 1	BATTERY WITH RESISTOR, (S49210069D)			
Z 2	XTAL OSC, (TCO-707F)	8.0 MHz		

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : Z35 LOW 1st MIX				
CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CH1H220J)	22pF, $\pm 5\%$ , 50V		
C 2	Cer, (CC732CH1H470J)	47pF, $\pm 5\%$ , 50V		
C 3	Cer, (CC732CH1H220J)	22pF, $\pm 5\%$ , 50V		
C 4	Not assigned			
C 5	Not assigned			
C 6	Cer, (CC732CH1H050D)	5pF, $\pm 0.5\%$ , 50V		
C 7	Cer, (CC732CH1H010C)	1pF, $\pm 0.25\%$ , 50V		
C 8	Cer, (CC732CH1H100D)	10pF, $\pm 0.5\%$ , 50V		
C 9	Cer, (CC732CK1H0R5C)	0.5pF, $\pm 0.25\%$ , 50V		
C10	Cer, (CC732CH1H060D)	6pF, $\pm 0.5\%$ , 50V		
C11	Not assigned			
C12	Cer, (CC732CH1H060D)	6pF, $\pm 0.5\%$ , 50V		
C13	Cer, (CC732CH1H070D)	7pF, $\pm 0.5\%$ , 50V		
C14	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V		
C15	Not assigned			
C16	Not assigned			
C17	Not assigned			
C18	Not assigned			
C19	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V		
C20	Not assigned			
C21	Cer, (CC732CH1H040D)	4pF, $\pm 0.5\%$ , 50V		
C22	Cer, (CC732CK1H020C)	2pF, $\pm 0.25\%$ , 50V		
C23	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V		
C24	Plast, (ECQ-V1H105JW)	1 $\mu$ F, $\pm 5\%$ , 50V		
J 1	Not assigned			
J 2	Not assigned			
J 3	Not assigned			
J 4	Connector, (U-PA1019)			
K 1	Relay, (712-12)			
L 1	Coil, (SP0408-R10M)	0.1.H		
L 2	Coil, (SP0408-R10M)	0.1.H		
L 3	Not assigned			
L 4	Not assigned			
L 5	Coil, (MLF3216DR10K)	0.1.H		
L 6	Coil, (SP0408-R10M)	0.1.H		
Q 1	Not assigned			
Q 2	Not assigned			
Q 3	IC, (DTC143EF)			

( ): Manufacturer's part number  
\* : Selected at factory

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Parts List : 235 LOW 1st MIX

CKT REF	DESCRIPTION	RATING	NOTE
Q 4	Di, (1S953)		
Q 5	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q 6	Tr, (2SC2407(1))		
R 1	MF, (RM73B2B151JD)	150 $\Omega$ , $\pm 5\%$ , 1/8W	
R 2	MF, (RM73B2B390JD)	390 $\Omega$ , $\pm 5\%$ , 1/8W	
R 3	MF, (RM73B2B151JD)	150 $\Omega$ , $\pm 5\%$ , 1/8W	
R 4	MF, (RM73B2B510JD)	510 $\Omega$ , $\pm 5\%$ , 1/8W	
R 5	MF, (RM73B2B510JD)	510 $\Omega$ , $\pm 5\%$ , 1/8W	
R 6	Not assigned		
R 7	Not assigned		
R 8	Not assigned		
R 9	Not assigned		
R10	Not assigned		
R11	CF, (ARD25T750J)	750 $\Omega$ , $\pm 5\%$ , 1/4W	
R12	Not assigned		
R13	Var, MF, (RJ-6P 10k $\Omega$ )	10k $\Omega$ , 1/2W	
R14	CF, (ARD25T332J)	3.3k $\Omega$ , $\pm 5\%$ , 1/4W	
R15	MF, (RM73B2B102JD)	1k $\Omega$ , $\pm 5\%$ , 1/8W	
R16	MF, (RS1PB100 $\Omega$ J)	100 $\Omega$ , $\pm 5\%$ , 1W	
Z 1	MIXER, (M-10 (8P))		

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : 236 EXT MIX IF AMP

CKT REF	DESCRIPTION	RATING	NOTE
C 1	Not assigned		
C 2	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C 3	Cer, (CC732CH1H330J)	33pF, $\pm 5\%$ , 50V	
C 4	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C 5	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C 6	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C 7	Cer, (CC732CJ1H040D)	4pF, $\pm 0.5pF$ , 50V	
C 8	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C 9	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C10	Cer, (CC732CH1H040D)	4pF, $\pm 0.5pF$ , 50V	
C11	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C12	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C13	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C14	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C15	Cer, (CC732CH1H060D)	6pF, $\pm 0.5pF$ , 50V	
C16	Cer, (CC732CH1H060D)	6pF, $\pm 0.5pF$ , 50V	
C17	Cer, (CC732CH1H040D)	4pF, $\pm 0.5pF$ , 50V	
C18	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C19	Cer, (CK924C1H104M)	0.1 $\mu F$ , $\pm 20\%$ , 50V	
C20	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
C21	Cer, (CK924C1H104M)	0.1 $\mu F$ , $\pm 20\%$ , 50V	
C22	Cer, (CC732CH1H120J)	12pF, $\pm 5\%$ , 50V	
C23	Cer, (CK734B1H104K)	0.1 $\mu F$ , $\pm 10\%$ , 50V	
C24	Not assigned		
C25	Cer, (CC732CH1H471J)	470pF, $\pm 5\%$ , 50V	
J 1	Connector, (u-SAL001)		
K 1	Not assigned		
K 2	Relay, (G5Y-154P DC12V)		
K 3	Relay, (G5Y-154P DC12V)		
K 4	Relay, (G5Y-154P DC12V)		
L 1	Coil, (SP0408-R10M)	0.1 $\mu H$	
L 2	Coil, (SP0408-R10M)	0.1 $\mu H$	
L 3	Coil, (MLF3216DR10K)	0.1 $\mu H$	
Q 1	Tr, (2SC2367)		
Q 2	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW	
Q 3	Di, (1SV34)		

( ) : Manufacturer's part number  
 \* : Selected at factory

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Parts List : 236 EXT MIX IF AMP

CKT REF	DESCRIPTION	RATING	NOTE
Q 4	Not assigned		
Q 5	IC, (DTC143EF)		
Q 6	IC, (DTC143EF)		
Q 7	IC, (DTC143EF)		
Q 8	Di, (1S953)		
Q 9	Di, (1S953)		
Q10	Di, (1S953)		
R 1	MF, (RM73B2B683JD)	68k $\Omega$ , $\pm 5\%$ , 1/8W	
R 2	MF, (RM73B2B102JD)	1k $\Omega$ , $\pm 5\%$ , 1/8W	
R 3	CF, (ARD25T601J)	600 $\Omega$ , $\pm 5\%$ , 1/4W	
R 4	MF, (RM73B2B470JD)	470 $\Omega$ , $\pm 5\%$ , 1/8W	
R 5	MF, (RM73B2B470JD)	470 $\Omega$ , $\pm 5\%$ , 1/8W	
R 6	CF, (ARD25T601J)	600 $\Omega$ , $\pm 5\%$ , 1/4W	
R 7	MF, (RM73B2B101JD)	100 $\Omega$ , $\pm 5\%$ , 1/8W	
R 8	MF, (RM73B2B683JD)	68k $\Omega$ , $\pm 5\%$ , 1/8W	
R 9	MF, (RM73B2B683JD)	68k $\Omega$ , $\pm 5\%$ , 1/8W	
R10	MF, (RM73B2B470JD)	470 $\Omega$ , $\pm 5\%$ , 1/8W	
R11	MF, (RM73B2B470JD)	470 $\Omega$ , $\pm 5\%$ , 1/8W	
R12	MF, (RM73B2B510JD)	510 $\Omega$ , $\pm 5\%$ , 1/8W	
R13	MF, (RM73B2B510JD)	510 $\Omega$ , $\pm 5\%$ , 1/8W	
R14	MF, (RM73B2B471JD)	470 $\Omega$ , $\pm 5\%$ , 1/8W	
R15	MF, (RM73B2B683JD)	68k $\Omega$ , $\pm 5\%$ , 1/8W	
R16	MF, (RM73B2B683JD)	68k $\Omega$ , $\pm 5\%$ , 1/8W	
R17	CF, (ARD25T181J)	180 $\Omega$ , $\pm 5\%$ , 1/4W	
R18	CF, (ARD25T181J)	180 $\Omega$ , $\pm 5\%$ , 1/4W	
R19	CF, (ARD25T181J)	180 $\Omega$ , $\pm 5\%$ , 1/4W	
R20	MF, (RM73B2B683JD)	68k $\Omega$ , $\pm 5\%$ , 1/8W	
R21	CF, (ARD25T102J)	1k $\Omega$ , $\pm 5\%$ , 1/4W	
R22	MF, (RM73B2B101JD)	100 $\Omega$ , $\pm 5\%$ , 1/4W	

( ) : Manufacturer's part number  
 \* : Selected at factory

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